DOCUMENT RESUME

ED 132 014 SE 021 450

AUTHOR	Bell, Loretta
TITLE	Eco-Kids: Experiment with Air on Spaceship Earth. [Project ECOLogy ELE Pak, Bell Pak].
INSTITUTION	Highline Public Schools, Seattle, Wash.
SPONS AGENCY	Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE	[76]
NOTE	77p.; For related documents, see SE 021 438-478; Not available in hard copy due to marginal legibility of original document
AVAILABLE FROM	Highline Public Schools, Instructional Division, Project ECOLogy ESEA Title III, Bill Guise, Director, 15675 Ambaum Blvd., S.W., Seattle, Wash. 98166 ($2.50)
EDRS PRICE	MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Elementary Education; *Elementary School Science; *Environment; Environmental Education; *Instructional Materials; *Interdisciplinary Approach; Pollution; *Units of Study (Subject Fields)
IDENTIFIERS	Elementary Secondary Education Act Title III; ESEA Title III

ABSTRACT

This is one of a series of units for environmental education developed by the Highline Public Schools. The unit, designed for intermediate grades in the elementary schools, is concerned with the study of air, air pollution, effects of air pollution, and ways of improving the quality of the air. Six lessons are included in the unit; most of the lessons contain activities that relate to a number of disciplines in addition to science. Background information, reference materials, and a film list are provided. (RH)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED132014

BELL PAK

E CO-KIDS

experiment with air or spaceship earth

by Loretta Bell

An Environmental Learning Experience designed for the elementary intermediate grades dealing with air pollution. One of many ELE's available for all grade levels.

Project ECOLogy, Title III ESEA
Highline Public Schools
P. O. Box 66100
Seattle, WA 98166
Phone: (206) 433-2453

SE 021 450

OVERVIEW OF UNIT CONCEPTS

1. We live in a deep ocean of air much like marine life lives in an ocean of water. This air is an invisible gas that is found in water, some solids and above the solid earth.

2. Matter is anything that has weight and occupies space. All matter differs in color, shape and texture. Air is a form of matter that is colorless, odorless, tasteless, invisible and takes up space.

3. Air is a form of matter that has weight and exerts pressure.

4. Living things need air to function properly. The great ocean of air in which we live is a mixture of many gases and is called the atmosphere. There are four layers of air in the atmosphere -- the troposphere, stratosphere, ionosphere and exosphere.

5. Air works for us, but the amount of air we have and can use on Spaceship Earth is limited.

6. Polluted air is air that contains impurities. Most air pollution is caused by man and harms life and property on Spaceship Earth.

7. Correcting air pollution is both possible and necessary. Eco-Kids join Future Man, the problem solver, as he develops creative solutions to the problems of the environment and to the quality of life in the future.

HELPFUL HINTS FOR TEACHING THIS UNIT

Before a student can begin to understand air pollution he should learn about air, what it is and what it can do. This Pak is designed to involve children with learning more about air and what is happening to the air that is all about them. Evolving out of these experiences with air will come the background necessary for decision making concerning the pollution of our living environment.

Since the study of our environment has become such a common language in our many different areas of study, each concept has been developed into several disciplines--science, social studies, music, art and the language arts. There may be times when the entire day will be devoted to developing a given concept, using several disciplines for that day.

Necessary materials not found in the regular classrooms are included in a kit, with materials for each lesson packaged separately and those materials to be used in more than one lesson loose in the kit.

The extra activities are designed primarily for keeping the accelerated learners busy and interested. The unit is designed for two weeks.

Good luck to you ECO-KIDS,----and have fun!

THINGS TO DO BEFORE TEACHING THIS PAK

1. The suggested list of visual aids includes descriptive summaries of each film and filmstrip. Select the ones you wish to use and make necessary arrangements for securing them. If you are working in the Highline District, Seattle, Washington, all of the visual aids are available from the E.R.A.C. library. It would be well to place your order three weeks before beginning the unit. Order blanks are included in this Pak.

2. Secure a daily paper for each class member.
   Suggestion:
   Contact a local newspaper to see if they will deliver copies for a minimal charge.
   Seattle area:
   Seattle Times - 622-0300
   Seattle P.I. - 622-2000

3. Contact the career people you wish to bring in to your classroom and set up a date, preferably for lessons #6 and #7.
   Look in the yellow pages of your local telephone book to secure numbers for:
   1. Local T.V. Stations to secure a Weather forecaster
      Seattle Area:
      KING - 682-3555 KCTS - 543-2000
      KIRO - 624-7077 KTNT - 682-0550
      KOMO - 624-6000

   2. Local Radio Stations to secure an announcer.
      Seattle Area:

KOMO - 624-6000	KJR - 937-5100	KVI - 682-3100
KING - 682-3555	KGDN- 542-3139	KIXI- 623-6910
KIRO - 624-7077	KTW - 624-6226	KAYO- 623-2480

   3. Local Newspapers to secure reporters
      Seattle Area:

Post Intelligencer- 622-2000	Kent News Journal - 872-6600
Seattle Times - 622-0300	Federal Way News - 839-0700
Highline Times - 242-0100	Tukwila News Register - 244-2763

   Should you decide to secure speakers, have the students compile questions they would like answered. Mail this list to the speaker to give him some guidelines for his presentation. It will be of interest for the children to know not only what he does, but what skills and training are required for him to perform his work.

4. A field trip to a local T.V. Station, Radio Station or a Newspaper could culminate the unit. If you wish to include such a trip, make the necessary arrangements now. Verify your date by filling out the request form for your trip and at the proper time send home student permit slips. If no school buses are available perhaps arrangements could be made for parents to provide transportation.

5. Have a folder for each student into which he will put his daily work, including work sheets, creative writing, poetry, spelling, illustrations, newspaper articles and art work. At the close of the unit each child will assemble his notebook and design a cover.

BACKGROUND INFORMATION

WHAT IS ECOLOGY?

Ecology is the study of all living things and the relationships between themselves and their environment.

WHAT IS ENVIRONMENT?

Environment is all of the things around a living plant or animal. Environment is all that can be seen, felt, tasted, touched and smelled.

WHO ARE ECO-KIDS?

Eco-Kids are champions of what is good and clean and are friends of plants and animals. They are aware of all pollutions and are constantly battling these mysterious enemies for survival of Spaceship Earth.

WHAT IS SPACESHIP EARTH?

Spaceship Earth is our world and we are all crew members aboard this Spaceship. We must start learning what we need to know in order to stretch our supplies aboard this ship. What training will we need? Where can we get this training and when should it start? The success of Spaceship Earth depends on each of us.

WHAT IS MATTER?

Everything in the world around us is matter. It is anything that has weight and takes up space. It may be visible or invisible, living or non-living. It can exist in 3 states - solid, liquid and gaseous.

WHAT IS AIR?

Air is a gaseous form of matter. It is made up of gases, about 78% nitrogen, about 21% oxygen and the remaining 1% is composed of carbon dioxide, water vapor and other gases.

WHERE IS AIR?

The earth is surrounded by gases that make up the air. It is found in soil, rocks, water and above the solid earth.

WHAT ARE THE PROPERTIES OF AIR?

Air takes up space, is colorless, odorless, tasteless, invisible, has weight and exerts pressure in all directions.

WHAT IS ATMOSPHERE?

Atmosphere is the mass of air, 500 miles to possibly 22,000 miles high, which surrounds the earth.

WHAT ARE THE FOUR LAYERS OF AIR IN THE ATMOSPHERE?

The atmosphere is divided into layers - the exosphere, ionosphere, stratosphere and, next to Earth, the troposphere.

WHAT IS SPACE?

Space is the region beyond the earth's layers of atmosphere.

WHY DO ANIMALS NEED AIR?

All living things, except a few bacteria, use the oxygen in the air, combined with the food they consume or store, to release energy to carry on life activities.

WHY DO PLANTS NEED AIR?

Green plants need carbon dioxide from the air, which is one of the materials used for photosynthesis, the food making process in plants. Without this carbon dioxide green plants could not make food and without the food stored by green plants life could not exist.

WHAT IS WEATHER?

Weather is the state or condition of the atmosphere, including the wind, clouds and temperature.

WHAT IS POLLUTED AIR?

Every year in the United States the atmosphere receives about 133 million tons of pollutants. The five major types of pollutants are nitrogen oxides, sulphur dioxide, hydrocarbons, carbon monoxide and particulate matter.

WHAT ARE THE MAIN SOURCES OF AIR POLLUTION?

The primary source is transportation, all types of motor vehicles. They account for 51% of total tonnage of air pollutants in the U.S. Other sources include manufacturing activities, electrical-power generating plants, all heating units, both large and small, land fill operations, garbage dumps and individual refuse burners.

WHAT IS SMOG?

Sunlight "cooks" the mixture of hydrocarbons and nitrogen dioxide which are formed by gasoline powered engines. This "cooking" makes other gases which are called smog.

WHAT IS A TEMPERATURE INVERSION?

An inversion layer of air is hot air that is formed at a fairly high altitude. It is hotter than the air near the earth's surface and causes the air near the surface to be trapped where it is. It cannot rise because the air above it is hotter than it is. Nitrogen dioxide and unburned hydrocarbons will be trapped for days at a time, while the sunlight changes them into smog.

MASTER MATERIALS LIST

To facilitate the use of this kit, materials for each lesson are packaged separately. Materials that will be used in more than one lesson are loose in the kit. An overhead projector and the Air Resource Center will be utilized in each lesson. All of the transparencies and pictures are placed in envelopes.

	PACKAGED	LOOSE IN KIT	NON KIT
Lesson 1	Sponge Piece of wood Rock Bottle and funnel Transparency listing air properties	Straws Plastic baggies & ties Balloons Tumbler	Small covered box Aquarium 2/3 full of water Water for tumbler Soil Bark from a tree Chalk Clay Straight pins Construction paper, 18"x24" Drawing paper 9"x12" Writing supplies
Lesson 2	Transparencies: Air properties Air related words Picture of matter Science experiment cards 3 covered jars Piece of cloth Medicine dropper Empty can Water gun	Plastic baggies & ties Tumbler Balloons Straws	Dictionary for each student Air notebooks Water Glass bowl 2/3 full of water Matches Clay Paper Towels Newspaper for each student Air Materials: scissors, paste, crayons, 9"x12" construction paper, yarn, cloth, scraps of colored paper
Lesson 3	Transparency of air related words Activity cards Food coloring Large handkerchief Empty thread spool	Ball of string Balloons Tumbler Straws	2 sheets thin paper 9"x12" Writing materials Yardstick 4 sheets 9"x12" paper Paper bag Water Pan or aquarium Air Notebooks Newspapers Magazines Scissors and paste Music Books, Grade 4, Silver Burdett, if available White construction paper, 9"x9"

	PACKAGED	LOOSE IN KIT	NON KIT
Lesson 4	Transparency depicting Earth and spheres Picture of plants and animals Map of U.S. to be duplicated for students	Plastic bag Thermometer	Dictionary for each student Air notebooks Writing materials Green plant Green leaves from a tree or plant Newspapers Art materials: drawing paper, paste, scissors, colored paper Music Books, Grade 4
Lesson 5	Transparency of story starters	Thermometer Straws	Dictionary for each student Writing materials Air notebooks U.S. wall map Newspapers White construction paper, 9" x 12" Variety of colored tempera paints Volunteers from 5th and 6th grade instrumental class with their wind instruments
Lesson 6	Transparencies: 1. House dust 2. Train smoke 3. Cases, cars and buses 4. Caveman 5. Temperature inversion Candle Tile Tweezers Glass slide Vaseline Magnifying glass Flashlight Pictures of clean and polluted air		5 bean bags or 5 small balls of yarn Writing materials Air notebooks Clay Tape Vacuum cleaner (from janitor) Facial tissue Dirty furnace filter Piece of nylon stocking Cardboard frame Guest speaker Music Books, Grade 4 Art Materials: crayons, water colors, paper, materials for collage
Lesson 7	Transparencies: 1. Ringelmann Chart 2. Electrostatic precipitator Rubber comb Piece of wool cloth		Writing materials Air notebooks Sheet of paper Chalk dust Musical recordings brought by volunteers Art materials 18"x24" colored construction paper

SUPPLEMENTARY BOOKS

(A suggested list for use in Air Resource Center)

1. ABOUT OUR WEATHER -- Gibson (3-5)
2. AIR ALL AROUND -- Pine and Levine (3-5)
3. AIR AND WATER -- Palmer (3-6)
4. KITES -- Kittelkamp, (3-5)
5. LET'S GO TO STOP AIR POLLUTION -- Chester (4-6)
6. THE AIR ABOUT US -- Parker (4-6)
7. THE FIRST BOOK OF AIR -- Knight (3-5)
8. THE FIRST BOOK OF SCIENCE EXPERIMENTS -- Wyler (4-6)
9. THE HOW AND WHY WONDER BOOK OF SCIENCE EXPERIMENTS -- Keen (4-6)
10. THE HOW AND WHY WONDER BOOK OF WEATHER -- Bonsall (4-6)
11. THE TRUE BOOK OF AIR AROUND US -- Friskey (2-5)
12. WHAT IS AIR -- Piltz (3-6)
13. WONDER WORLD OF AIR -- Fisher (3-5)

<u>TEXTS</u>:

1. CONCEPTS IN SCIENCE, Book 4, Brandwein

   Unit Four, The Travels of Some Molecules, A New View of Matter, Pages 99-133

2. SCIENCE IN YOUR LIFE, Book 4, Schneider

   Weather, pages 49-76
   Moving Things in Air, pages 140-158
   You Use Air, pages 159-167

3. SCIENCE, UNDERSTANDING YOUR ENVIRONMENT, Book 4, Silver Burdett

   Unit 2, Using the Atmosphere, pages 27-39
   Unit 4, Moving Man and Matter, pages 83-107
   Unit 7, Understanding the Weather, pages 189-215

SUGGESTED LIST OF VISUAL AIDS

LESSON	FILMS	FILMSTRIPS
1	AIR: A FIRST FILM (FA-1968) 10 min. Our earth is covered by an ocean of air. Although it is all around us, air cannot be seen, but still it is an important part of the world on which we live.	THE AIR (EBE-1955) 50 frames Art work explains the following basic concepts about air: that it is all around us; that it presses against things; that we can make the air move; that the air around us is always moving; that moving air is useful; and that it covers earth like a blanket.
2	WIND SOUNDS (Churchill-1968) 16 min. Explores a way sounds are produced on wind instruments. Children experiment with making sounds on objects as well as instruments. NEWSPAPER SERVES ITS COMMUNITY (FA-1966) 15 min. How a newspaper works. Emphasizes the ways it serves its community.	
3	AIR AND WHAT IT DOES (EBE-1962) 11 min. The problem-solving approach to real-life situations gives children an opportunity to "discover" basic concepts about air. They will learn how it moves, expands or contracts, exerts pressure and why it is essential to living things.	
4	OCEAN OF AIR (United World-1961) 14 min. Combines photography and animation to help students understand the what, where and how of air, and its meaning to plants and animals.	HOW ANIMALS LIVE IN THE AIR (Curr. 1951) 27 frames Basic principles of flight; special adaptations for getting food. AIR, WIND AND WEATHER (Eyegate-1958) 36 frames Covers basic theories: animals and plants need air to live; wind is moving air; rain and snow come from clouds; clouds from water vapor in the air; and other facts.

LESSON	FILMS	FILMSTRIPS
5	AIR ALL AROUND (McGraw-1963) 11 min. Illustrates some of the ways in which we use air: in tires, in air brakes and air drills, in sand blasting, in furnaces and camp fires, for jet planes, to fly kites, etc.	STORY OF THE AIR (EBE-1953) Pictures show how the atmosphere in motion enables ice and water to change the earth's surface; how changes in temperature help tear down rock; how winds use dust and sand to change the land.
	WIND: A FIRST FILM (FA-1966) 10 min. We cannot see the wind, but we can see what it does. As it moves over city and countryside, it lifts our kites, dries the wash on the line, and shakes the trees. Sometimes it brings clouds that make rain.	
	WIND AT WORK (Dowling-1960) 11 min. What makes the wind and what the wind does is explained in live photography and by graphic illustration and animation.	
	FIRE: WHAT MAKES IT BURN (EBE-1962) 11 min. Uses simple laboratory demonstrations to show what is needed to make a fire, what a flame is, how combustion takes place, and how a fire can be extinguished.	
6	ENERGY CRISIS (Journal 1972) 12 min. Reviews the different energy sources and indicates the length of time we may be able to depend on them. A conventional steam driven electrical power plant, a hydro-electric plant and a nuclear power plant are visited to display how each generates power and to show the limitations each has in satisfying future demands for power. Ends with "Fast Breeder Reactor" and "Fusion Reactor" developments.	
	AIR POLLUTION: A FIRST FILM (BFA-1971) 8 min. Air pollution irritates our eyes and nose, causes diseases, and damages plant and animal life. Almost all of man's activities can contribute to air pollution, so everyone is responsible and must share in correcting our pollution problems.	

LESSON	FILMS	FILMSTRIPS
7	CONSERVING OUR ENVIRONMENT: POLLUTION CRISIS (Coronet-1972) 14 min. Confronts students with the overwhelming nature of the human-created pollution predicament. Also shows that there are human-made solutions. IT'S JUST ONE PIECE (Sensory 1974) 13 min. Designed to create an awareness of the beauty of nature, expands into specific examples of litter, air, water and noise pollution. Emphasis is on an individual's attitude toward each. JOEY'S WORLD (Pyramid Films 1973) 23 min. Shows man wasting his energy resources. Effective format, tough narration, borders on negative aspects but the strong overall theme is "I can save the earth". UNCLE SMILEY GOES PLANTING (LCA-1972) 16 min. Uncle Smiley takes his group of young friends on a hike through the forest to plant a tree. A series of misadventures teach lessons in safety, litter cleanup and forest fires.	AIR POLLUTION (Centron-1972) 105 frames Scrutinizes this major environmental problem in a thoughtful manner; suggests specific activities for students to help combat pollution in their own communities.

LESSON 1

CONCEPT: Air is an invisible gas that is found in water, some solids, and above the solid earth. We live in a deep ocean of air much like marine life lives in an ocean of water.

MATERIALS:

Kit Materials

Straws
Baggie and tie
Balloon
Tumbler
Sponge
Piece of wood
Rock
Bottle and funnel
Transparency listing air properties

Non Kit Materials

Overhead projector
Discovery box, a small box with cover
Supplementary books on air
Aquarium 2/3 full of water
Water for tumbler
Soil
Bark from a tree
Chalk
Clay
Pins
Construction paper, 18"x24"
Drawing paper 9"x12"
Writing supplies

PROCEDURE:

ORAL LANGUAGE

Inquiry:

Show the class a discovery box which is filled only with air. The purpose is to improve their ability to ask questions and to determine the properties of air.

Write the word property on the board.

What is this word and what is its meaning? Discuss. (A quality belonging especially to something. Soap has the property of cleaning dirt.)

You are to determine what is in this box by asking questions. To help you do this, you will ask me questions to which I can answer only yes or no, and you can then discover the properties of what is in the box. For example, what are the properties of this chair, and what are some questions you could ask to determine these properties? (Is it made of wood, does it have weight, is it smooth, is it useful, etc.)

Raise your hand if you are ready to ask a question concerning the contents of this box. When you have finished asking your question and I have answered you with yes or no, please say, "I pass". You then choose someone else to ask his question. You must ask questions to which I can answer only yes or no. Do you all understand the procedure?

After they have determined that the contents of the box is air, guide them into a discussion of comparing pure air with the air in various communities, such as industrial, city, forests, etc. Hopefully, some of the following properties of air will be discovered. Write them on the board.

1. Pure air is colorless.
2. Pure air is odorless.
3. Pure air is tasteless.
4. Pure air is invisible.
5. Air works for us.
6. Wind is moving air.
7. Air takes up space.

If students have had no experience with some of these properties, wait until later to present them.

Write the word Environment on the board. *What does this word mean to you?* Discuss.

What is your environment? Think of all your surroundings - including other humans, animals, plants, weather, air and so on. What are your five senses? (sight, touch, taste, smell, hearing) *Can you see your environment? Can you touch it?* (Discuss each of the senses in relation to the environment).

What are some natural things in your present environment? (chairs, tables, classroom, clock, books, clothing, etc.)

Write the word Ecology on the board.

This word is fast becoming a part of everyone's vocabulary. What does it mean to you? Discuss.

The word ecology comes from two Greek words: oikos, meaning house, and logos, meaning to study. Ecology, then, is a study of houses. Do you agree? Why?

We can think of the entire earth as a "house" where we all live. Ecology is a study of all living things and the relationships between themselves and their environment, or the place in which they live. We can think of our home, the Earth, as a spaceship and refer to it as Spaceship Earth.

We live in a deep ocean of air much like marine life lives in an ocean of water. Do you agree with this statement? If so, why? If not, why not? (Open ended discussion.)

READING

Materials: School and room libraries.

With your librarian, set up a time when you can send committees to the library. Ask your librarian to help the students select books and materials pertaining to AIR. These will be checked out and placed in the classroom AIR resource center.

Write the word Eco-Kids on the board.

What is this word and what kind of kids would they be? Discuss. Add this idea, - *Eco-Kids are champions of what is good and*

clean and are friends of plants and animals. They are aware of all pollutions and are constantly battling these mysterious enemies for survival of Spaceship Earth.

Write the words Spaceship Earth on the board.

What is this word and what does it mean? Discuss and add to their answers, *Spaceship Earth is our world and we are all crew members aboard this Spaceship. As crew members, we must learn how to stretch our supplies aboard this ship, for the success of Spaceship Earth depends on each of us. What training will we need? Where can we get this training and when should it start?* Discuss. (By reading, observing and asking questions concerning what is needed to survive on this Earth, what natural resources Earth provides, how we must take care of these resources, etc. This learning must be continuous, beginning in the home with pre-school children.)

For the next two weeks we will do research reading to learn more about air on Spaceship Earth. Committees will go now to our school library and check out books and any other materials that have information, stories, and experiments pertaining to air. Other committees will check books and encyclopedias in our room library. Another group will set up a resource center for these books here in our classroom. Our library may have filmstrips pertaining to air. A committee will check these out and place them in our viewing center. (Select the committees and proceed with setting up the resource center. Get everyone involved.)

SCIENCE

You may want to begin the science lesson by showing the suggested visual aids, or any other aids which are available to you. Follow with a question and answer session.

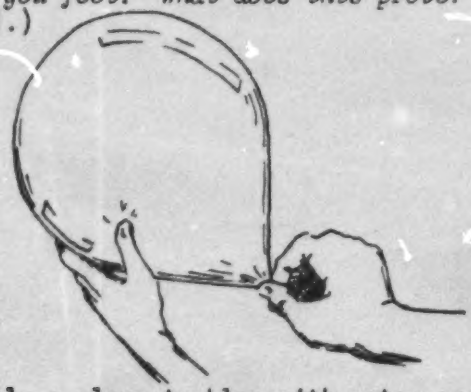
Demonstrations, using kit materials:

Since we now know that we live in an ocean of air, how might we discover and prove that there is an ocean of air around us and that many things in our environment contain air? Class discussion.

1. Ask for a volunteer to blow through a drinking straw.
   Can we see air coming out of the opposite end of the straw? (No)
   How can we know for sure there is air coming out? (By feeling it.)

2. Another volunteer blows up a small baggie and ties it.
   How is this bag different now? Is it lighter or heavier in weight? How could we prove that there may be a difference in weight? (Discuss.)

3. A volunteer blows up a balloon.
Pinch the balloon and tell us what you feel inside. (Air)
The only thing you put into the balloon was air, so it must be air that you feel. What does this prove?
(That air is real.)



4. Another volunteer fills a glass tumbler with water and class looks for bubbles in the water.
If there are bubbles visible, what do they prove?
(Presence of air.)

5. Have another volunteer place a straw in the glass of water and blow through it. They will observe air bubbles rise to water surface and will see the presence of air.

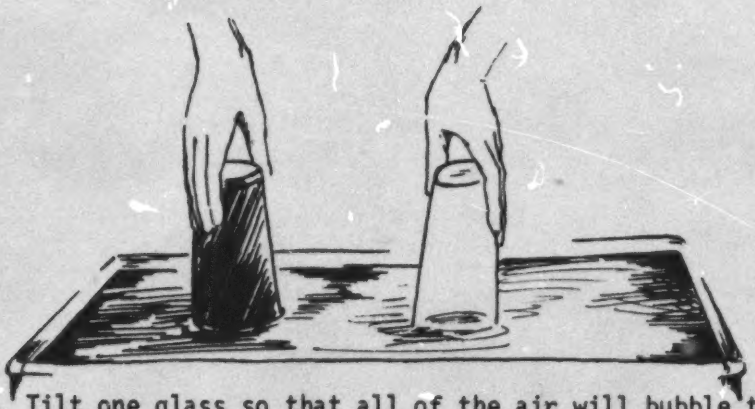
6. *We have proved that air is present in water. How can we determine whether or not air is present in objects such as rocks, soil, bark of a tree, wood, stone, chalk, sponge, etc.* (Emerge in water and watch for bubbles.)

While a committee sets up an aquarium with water, let other students suggest and gather items to be tested. Show them the items provided in the kit and let them provide additional items. If an aquarium is not available, any large glass container may be used. Students should be able to compare differences in the amounts of bubbles emitting from the different objects.

7. Prove that air is real and occupies space:
Materials: aquarium or glass bowl filled 2/3 with water,
2 plastic glasses.

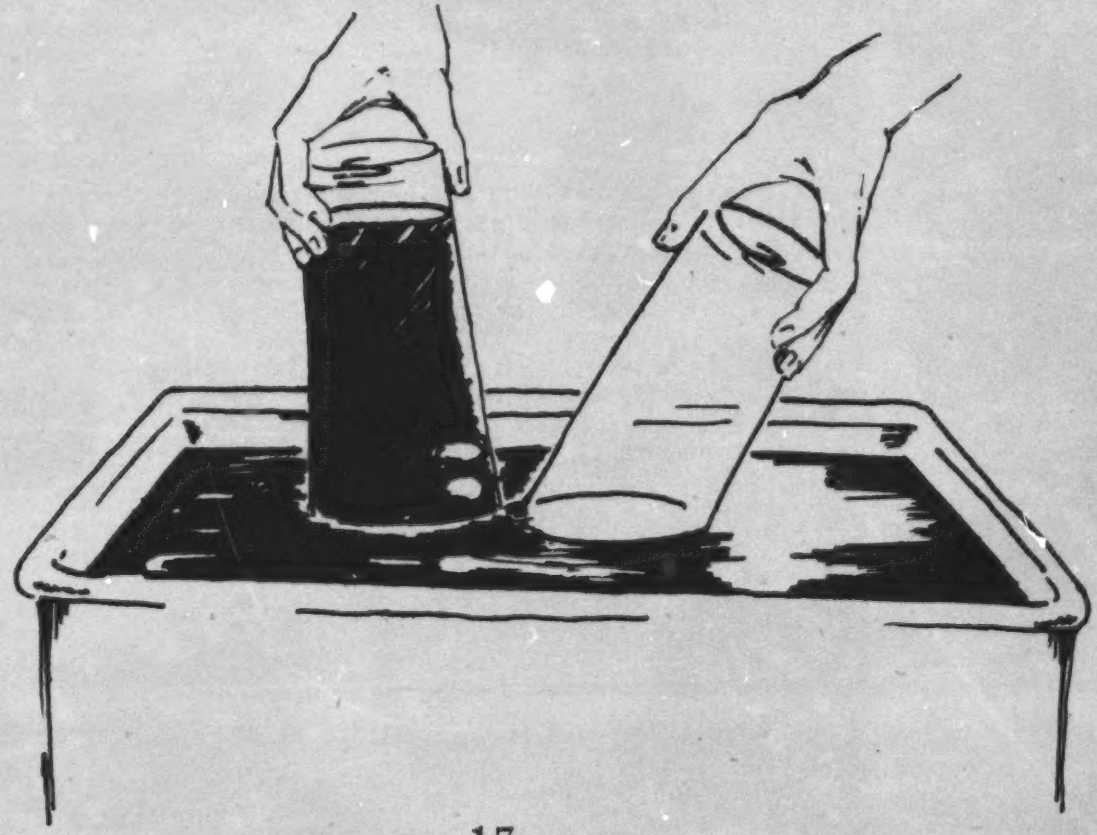
Push an upside-down glass straight down into the container of water. Tilt the glass slightly and some of the air will get out and bubble up to the surface.

Push two upside-down glasses into the water until both are completely under water.



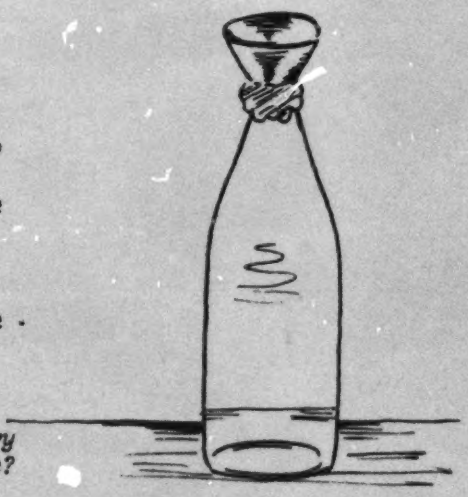
Tilt one glass so that all of the air will bubble to the surface. One glass will now be full of water, and the other full of air. Raise them so that the open ends of the glasses remain beneath the water, but most of the glasses are out of it, as shown in the picture. Move the glass full of air so that an edge is under the glass full of water, tipping it so that the air bubbles up into the glass full of water. As the air from one glass bubbles into the other, the glass full of water will become filled with air and the glass which was filled with air will now be filled with water.

You can keep pouring the air back and forth from one glass to the other if you are careful. Air, like water, is real, and two real things cannot fill the same space at the same time, so a glass may be filled with either air or water, but not both.



8. Materials: narrow necked bottle, funnel, clay, glass of water, pin and 2 volunteers.

Place a funnel into the bottle and seal it with clay around the outside of the bottle's rim. Second volunteer now tries to pour water into the bottle through the funnel.



Why doesn't the water go into the bottle? (The bottle is already full of air and there is no room for the water.)

What can be done to get the water into the bottle? (Take a pin and puncture the clay seal.)

What will happen now if we try to pour water into the bottle? Why? (Air will be able to escape through the pin hole as it makes room for the water.)

What fact does this experiment demonstrate? (That air is real and it does take up space.)

SUMMARY

A transparency listing the properties of air is included in the kit. It may be used as you summarize the lesson. Show only those properties studied today.

What additions can we make to our list of air properties?

Possible answers: Air is real and takes up space. Air is present in many different things.

Use transparency to show these additions of air properties.

Leave the experiment materials set up and suggest that during free time individuals or small groups try the experiments on their own.

Tomorrow you will be performing experiments in small groups and we will need some materials. Ask volunteers to bring the following articles for tomorrow's lesson -- glass bowl, magazines, daily newspapers.

SOCIAL STUDIES

What people in our working world perform tasks that are related in any way to air? Do some brain storming and make a list.

This may be done individually, in pairs or small groups. When finished, share the lists with the class.

ART

Materials: 18" x 24" construction paper, one for each student

Each of you will make an AIR notebook. Into this notebook you will put illustrations and written results of science experiments, things you write creatively about air, including poems, stories, and puzzles, spelling word lists that pertain to air, and one section can be a scrapbook. What could the scrap book section include? (Daily local and national weather reports, local weather predictions, news articles and pictures concerning air, wind storms, air pollution, etc.)

Hand out the construction paper and fold into 9" x 12" covers.

Each day's work will be put into these folders, and at the close of our AIR study, you will design a permanent cover for your notebook. On this temporary cover you can now design a title and your name, so each folder can easily be identified.

EVALUATIVE ACTIVITY: Give each student a piece of 9" x 12" drawing paper. Ask them to illustrate something that will prove the presence of air. Encourage them to be imaginative and illustrate something different from the experiments we used in science class today. When the pictures are completed have them write an explanation of how this illustration proves the presence of air. Share with the class, then place into their folders.

SUGGESTED EXTRA ACTIVITIES:

1. Drop a ping-pong ball into the water in a glass bowl. Invert a glass tumbler over the floating ball. Push down. Note the level of the water as you push downward. What is happening? Why?

2. Fill a bowl with water and place it in a pan to catch the overflow as you perform this experiment. Partially inflate a balloon. Force the balloon under water so that the entire balloon is under the water surface. What happens to the water in the container? Why did it overflow? Have the balloon inflated still further and submerge it again. What happens this time? Why did more water overflow? What does this show about air?

LESSON 2

CONCEPT: Matter is anything that occupies space. All matter differs in color, shape and texture. Air is a form of matter that is colorless, odorless, tasteless, invisible and takes up space.

TIME: One day, interdisciplinary

MATERIALS:

Kit Materials:
- Transparency listing air properties
- Transparency of air related words
- Science experiment cards
- 3 covered jars
- Plastic baggies and ties
- Tumbler
- Balloons
- Tumblers
- Piece of cloth
- Medicine dropper
- Empty can
- Straws
- Water gun
- Transparency depicting matter

Non Kit Materials:
- Overhead projector
- Dictionary for each student
- Air notebooks
- Air Resource Center
- Water
- Paper towels
- Glass bowl 2/3 full of water
- Matches
- Clay
- Newspaper for each child
- Art Materials: scissors, paste, crayons, 9"x12" construction paper, yarn, cloth, scraps of colored paper

PROCEDURE:

ORAL LANGUAGE

Write the word matter on the board.

What is this word and what is its meaning? (Elicit answers and then have the class use dictionaries to look up its meaning. Discuss)

Write on board, All things are matter.

What does this say? Do you agree? Why or why not? (Discuss)

Do you see any matter in this room? (Discuss)

How would you decide if these things you have mentioned are matter? (Do they take up space, have weight, are they solid, liquid or gaseous.)

From our discussions let us now compose a good definition for the word matter. (Write their definition on the board and have the class copy it. Place into their notebooks under the heading "Glossary".) (Discuss the meaning and value of a Glassary.)

Definition: Matter is anything that has weight and occupies space. Everything in the world around us is matter. Matter can be solid, liquid or gaseous. Matter differs in color, shape and texture.

Let us review the properties of air that we learned yesterday. Why did we say pure air is colorless, odorless, tasteless and invisible? Have you experienced air that was not pure? Where? How could you tell it was not pure air? (Discuss, using transparency that lists properties of air, but show only those properties studied yesterday.)

What did we do yesterday to prove that air takes up space? (Blew air into a balloon and baggie.) *Would you say that air has any shape of its own? Why? Why not?* (Discuss)

Can you now compose a good definition for air? (Discuss. Compare their definitions with that found in their dictionaries.)

Definition: Air is an invisible gas that is found above the earth, in water and in some solids. It is a form of matter that is invisible, colorless, odorless, tasteless, has weight and takes up space. It has no definite shape of its own.

Write the definition on the board for the class to copy and place into their glossaries.

READING:

Materials: Room Resource Center with AIR books

Individuals, or students working in pairs, select an AIR book from the Resource Center and all will engage in a silent reading period. At a given time they will present to the class an interesting fact from his reading. Some may choose to ask a question pertaining to air.

SPELLING:

Let each student make a list of air related words that he thinks will be used during the study of this Pak. Encourage them to use dictionaries, supplementary books, science books and daily papers.

At a given time let them share their lists and as words are suggested you write them on a chart, overhead projector, or blackboard. Use phonetic skills in helping the students spell correctly. Use skills such as syllabication, digraphs, dipthongs, silent letters, final e, long and short vowels, etc.

This is a suggested list of words:

air	invisible	breathe	forecast	gaseous
space	earth	polluted	experiment	space
matter	spaceship	pollution	visible	
properties	shape	ecology	shape	(etc.)
odorless	Eco-Kids	environment	liquid	
tasteless	oxygen	weather	solid	

If possible, make a transparency of your list of words, to be used in future lessons, or use the one included in the kit.

MATH:

Scientists use a measure called cubic centimeters (cc) to describe how much space certain matter fills. Could we say that the human brain is matter? (Discuss)

The human brain fills 1500 cc of the space in the skull. A chimpanzee's brain fills 500 cc of the space in his skull. Estimate how much larger the human brain is than a champanzee's brain. (3 times)

Could medication in the form of aspirin be considered matter? How? (Discuss. Has weight, occupies space, etc.)

A doctor prescribed a dose of 20 grains of aspirin a day for an adult patient. Each aspirin an adult takes contains 5 grains. How many aspirin tablets a day did the doctor prescribe for his patient? (20 ÷ 5 = 4 aspirins)

Students may compose math problems for the class to solve.

SCIENCE:

Divide the class into six groups and set up six experiment stations with the necessary directions and equipment for groups to perform experiments. Each group selects two people, a leader who will read the directions and a second person who will record the data at each station. The recorders will need a paper and pencil. Each group will then begin at a given station and at your appointed time the teams will progress to the next station, continuing until they have tried all experiments. At the end of the session compare data and draw conclusions.

Station 1. (Matter)
Materials: 3 jars - one with water, one with gravel and one empty

Directions: Only your leader will peek into the jars to determine the contents. Your leader will now conduct an inquiry session so that you can determine the content of each jar. Your recorder will record the properties of the matter in the jars as you make your discoveries.

Station 2. (States of matter, solid, liquid and gas)
Materials: 3 plastic bags and ties, tumbler of water

Directions: Using three plastic bags, can you design an experiment to show the three states of matter -- solid, liquid and gas? Record your experiment and results.

Station 3. (Air is invisible and has no definite shape)
Materials: Plastic bags, balloons

Directions: Gases, or air, have no definite shape. They take the shape of the container they occupy. Can you prove this by performing an experiment with a plastic bag? a balloon? Make a list of other things you might use to prove that air is invisible, colorless and has no definite shape of its own. Record your results.

Station 4. (Air takes space)
Materials: Glass bowl 2/3 full of water, tumbler, paper towel, piece of cloth

Directions: Push the piece of cloth to the bottom of a dry tumbler. Turn the tumbler upside down (making sure that the cloth stays in place), and push it straight down into a bowl of water. Be sure that the bowl holds enough water to cover the glass. Remove the tumbler and examine the cloth. Try it again and this time use the paper towel. Crumple it up into a ball and put it down into the tumbler. What happened each time? You have proved that air has what property? Record your results.

Station 5. (Air is real and fills empty things)
Materials: Tumbler of water, medicine dropper, drinking straw, water gun, empty can with a hole in the top and bottom of it.

Directions: Are the medicine dropper, drinking straw, water gun and the can really empty? Using the water in the tumbler can you prove that they are or are not? If they are not really empty what have you done to their contents when you placed water in them? Record your discoveries.

Station 6. (Air takes space)
Materials: Glass bowl 2/3 full of water, tumbler, ball of clay, match

Directions: Make a small ball of clay. Place it into the tumbler and press it down so that it will stick to the bottom of the glass. Stand a match up in the clay. The head of the match must not come up above the top of the glass.

Turn the glass upside down and push it straight down into the water. Lift the glass out of the water. With dry hands take out the match. Is it wet? Try to strike the match. Record your discovery.

Summary:
Compare data and draw conclusions for each of the six experiments.

SOCIAL STUDIES:

Materials: Newspaper for each student. Scissors, paste, AIR notebooks

To become familiar with a daily paper and to learn where to look for articles pertaining to AIR, peruse an issue together, locating and naming the various sections. Discuss each section, using questions such as:

How can the editorial page be used as a sounding board for local and national environmental problems and for solutions to these problems?

In addition to the editor, what other types of workers are employed by newspapers? (Cartoonists, photographers, feature story writers, poets, reporters, sports editors, etc.)

Now that you have become familiar with the many sections of a daily paper, can you find news articles or information related to AIR? In what section would you be most likely to find this information? (Discuss)

Cut out articles or pictures that you find and paste them into your AIR notebooks. Share with the class.

MUSIC:

Do members of a band and orchestra use air in any way to produce musical sounds? How? What instruments are used? (Discuss)

If available, show the film "WIND SOUNDS". The accompanying record illustrates what you have discussed.

Air passing over the reed of a clarinet makes the clarinet produce a musical sound. Air vibrating across the mouthpiece of a flute makes high, thin notes. Air vibrating in a French horn makes mellow, rich sounds. Air passing through a tuba makes a low, low sound. Air helps to make many musical sounds and carries these sounds to our ears.

ART:

Materials: crayons, scissors, glue, boxes of colored paper scraps, yarn, pieces of material, sheet of 9"x12" construction paper for each student

Make a picture of yourself doing some fun thing in an environment that has many different kinds of matter, showing a gas, a solid

and a liquid. You may use crayons, cut or torn colored paper, yarn and other things from our box of art supplies.

Share the finished pictures with the class. Display on bulletin board and place in folders when this Pak is completed.

EVALUATIVE ACTIVITY:

Show the transparency that depicts matter. Direct the class to make three columns on their papers, heading each column with a state of matter:

1. Solid 2. Gas 3. Liquid

From the picture, list all matter they see and place each item in its proper category.

Turn their papers over and list other matter they see in the classroom, placing each item in its correct category.

SUGGESTED EXTRA ACTIVITIES:

1. Set up a discovery table in the Science resource center. Cover the table with paper. In the center place some gravel, bottle of water, inflated balloon, small living plant, tree branch, rock, pencil, crayon, book, ice cube, etc. Write partial words at random on the table, such as l_q _ _ d, s _ _ _ d, g _ s, m _ _ _ er, l _ v _ ng, n _ n l _ v _ ng.

   Students will examine the items on the table and complete the words on their own sheets of writing paper. Then they will list the objects in their proper category. When all have had a turn, let volunteers go to the table and fill in the letters for the unfinished words. Others can go to the table and write the names of the objects under the names of their proper categories.

2. MUSIC MAKER
   Make a musical instrument using air and anything else you wish.

LESSON 3

CONCEPT: Air is a form of matter that has weight and exerts pressure.

TIME: One day, interdisciplinary

MATERIALS:

Kit Materials

Transparency of air related words
Science activity cards
Ball of string
Balloons
Tumbler
Straws
Food coloring
Large handkerchief
Empty thread spool

Non Kit Materials

Overhead projector
2 sheets thin paper 9" x 12"
Air Resource Center
Writing materials
Yardstick
4 sheets 9" x 12" paper
Paper bag
Water
Pan or aquarium
2 cards - 5" x 7"
Air notebooks
Newspapers
Magazines
Scissors and paste
Music Books, Gr. 4, Silver Burdett if available
White construction paper 9" x 9"

PROCEDURE:

ORAL LANGUAGE:

We have learned several things about air. Do you find it difficult to picture something you can't see and difficult to believe something is real if you can't look at it and touch it? (Discuss)

We have discovered that air and water can't fit into the same glass, any more than you and a friend can fit into the same clothes at the same time. We have proven that air is real, that it is a form of matter and it takes up space.

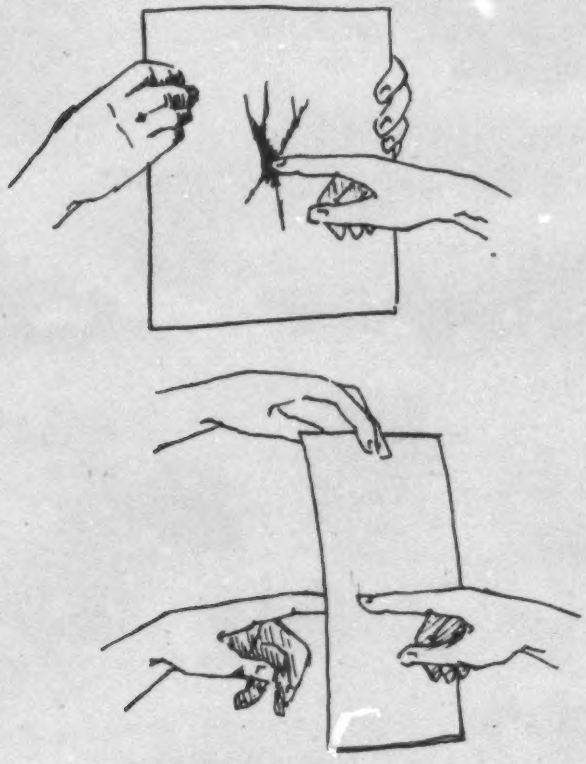
Today we will try to discover something else about air. Do you think air has any weight? (Discuss) *Do you think there is any difference between warm and cold air? Which do you think is heavier? In your research reading today look for information about warm and cold air.*

Air has great weight. This weight acts as a force on everything on earth. This force is called pressure. How much does air weigh? It depends on when and where you measure it. The air in your living room may weigh as much as you do. Right now there is a column of air resting on your head and shoulders which is several hundred miles high. It weighs hundreds of pounds. How can you support such a weight? You couldn't bear it at all if the same air pressure in your body didn't also push in the opposite direction.

Let's try an experiment to prove this theory. A volunteer holds a thin piece of paper 9" x 12" in both hands. Another volunteer pushes a finger against one side of the paper and pokes a hole right through. Take another piece of paper and the second volunteer,

using a finger of each hand pushes at the same spot from each side of the paper.

How does this demonstrate the air pressure around you and the air pressure in your body? Discuss. (The pressure of air in your body is equal to the pressure of that column of air resting on your head and shoulders.)



READING:

Using the Air Research Center, do research reading today to discover the differences between warm and cold air, and how we can be sure that air has weight.

SPELLING:

Add to the spelling list any more air-related words that the class may have discovered. Write them on the board, on your chart or overhead, as the students share the words orally. Students will write them and place the list into their folders.

Their additions may include:

exerts
pressure
weight

Show the transparency (or chart) of spelling words, in addition to today's new words. Have each student alphabetize the complete list of words. Place the list into their AIR notebooks for future study and reference.

CREATIVE WRITING:

Write two paragraphs. The first paragraph will tell how warm and cold air are different from each other. The second paragraph will tell how you know that air has weight and exerts pressure. Use your AIR spelling list and your dictionaries to help you spell words correctly. Edit, share and place in folders.

MATH:

Materials: Paper and pencils

Air pressure at sea level is about 15 pounds per square inch. Suppose the top of a note pad is 9 square inches. How many pounds of air pressure will be pressing down on the note pad? (Discuss, then each child solves the problem individually. Compare answers. 15 x 9 = 135 pounds)

Air pressure becomes less as you rise from the earth's surface. About one half mile above the earth, the air pressure is almost two pounds less than at sea level. If the air pressure is 15 pounds per square inch at sea level, how great is the pressure one half mile about the earth? (13 lbs.) *How many pounds of air pressure will be pressing down on the top of the same note pad now?* (13 x 9 = 117 pounds)

Jet airliners travel where the pressure is about 5 pounds on each square inch. The pressure inside the plane must be made greater than the outside pressure. Passengers could not live in air as thin as the air outside the cabin of the plane. Let us suppose there are 25,739 square inches on a wing of our plane. How many pounds of air pressure will be pressing down on that wing? (Discuss, then each child solves the problem. Compare answers. 25,739 x 5 - 128,695 pounds)

Encourage the class to create similar story problems for the class to solve.

SCIENCE:

Materials: Set up eight experiment stations with the necessary equipment for groups to perform the experiments. Divide the class into eight groups and each group selects a leader and a recorder.

Today we have eight experiment stations. The class will be divided into that many groups and each group will be assigned only one station where you will practice doing the experiment that is set up there. When all the groups have practiced you will perform your experiment again--this time for the entire class. The leaders will explain what you are going to do and will ask the class what they predict will happen. After you have performed the experiment, the leader will ask the class to tell what did happen, why it happened and what your experiment proved. Are there any questions?

Station 1 (Air has weight)

Materials: Yardstick, string, balloons

Directions: Tie a yardstick to the back of a chair. Make sure that the string is in the exact middle of the yardstick, and that the yardstick is balanced so that it hangs in a straight horizontal position. Blow up two balloons that are the same size. Tie the ends of the balloons and fasten one to each end of the yardstick, the same distance from the ends of the stick. Carefully put a hole in the neck of one of the balloons with a pin. Explain what happens. What two properties of air have you proved? Record your discovery and state which property of air this proves.

Station 2 (Air exerts pressure)

Materials: Paper bag, 2 or 3 books, writing paper and pencil

Directions: Place a paper bag on the table. The open end should be over the edge. Place a book on the bag. Now hold the open end of the bag against your mouth and blow hard. What do you predict will happen? Try the experiment. What did happen? Why? Add one or two more books to the first one. Again blow up the bag. What happened? Why? Record your discovery and state which property of air this proves.

Station 3 (Air exerts pressure)

Materials: 2 sheets of paper 9 x 12, writing paper and pencil

Directions: Crumple one sheet of paper into a tight ball and leave the other sheet flat. Drop the pieces of paper at the same time and from the same height. What do you predict will happen? Why? Now perform the experiment. Make a note of the result and state the reason for the result. Can you think of any other objects you might use to try this experiment? Try some.

(Flat piece flutters down, while wadded paper falls quickly. This is because air pushes in all directions, but the broader the surface the greater the upward push, so the flat piece comes down more slowly.)

Station 4 (Air presses in all directions and can support a column of water.)

Materials: Tumbler, card, water and aquarium or large pan, writing paper and pencil

Directions: Air pushes down. Air pushes up. Air pushes on all sides of things. Find out how air pushes. Fill a tumbler with water. Hold a card on top. Turn the glass upside down and take your hand off the card. Perform the experiment over the pan. Before you perform the experiment what do you predict will happen? Why? Now, perform the experiment. What happened? Why? What property of air is proven by this experiment? Record your discoveries.

Station 5 (Air exerts pressure)

Materials: Straw, piece of paper, writing paper and pencil.

Directions: Hold a straw in your hand. Like the pressure within your body, the air pressure inside the straw is the same as the pressure on the outside. Cut a piece of paper about one inch square. Hold it against one end of the straw and suck through the other end. Continue to suck but remove your hand from the piece of paper. What happens? Why? Record your discovery and state which property of air this proves.

(As the air is sucked from the straw, the inside air pressure becomes less than that outside the straw. The outside pressure pushing the paper at the end of the straw holds it in place.)

Station 6 (Air exerts pressure)

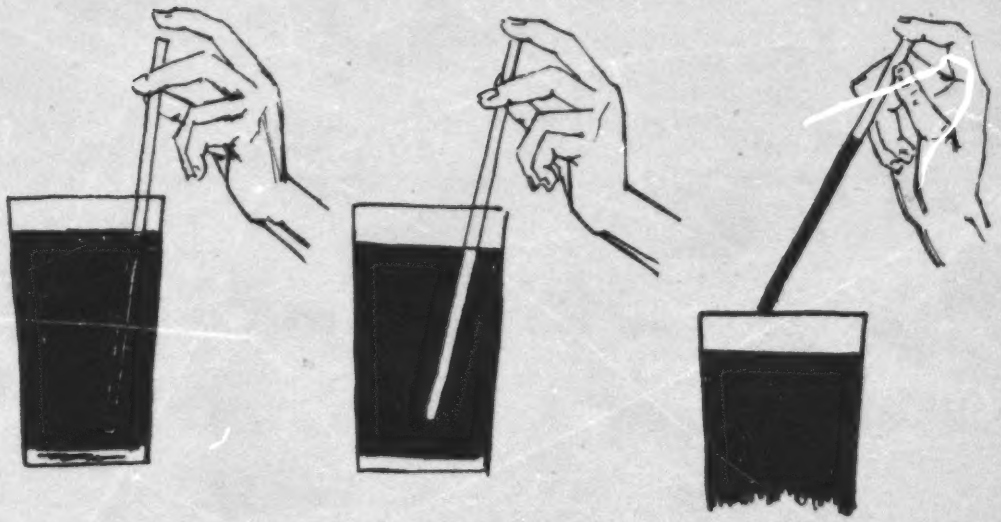
Materials: Tumbler, water, straw, food coloring, writing paper and pencil

Directions: Lower a straw into a tumbler of colored water. Does water enter the straw or not? Remove the straw from the tumbler. Place your finger over the top open end and lower the straw into the water again. What stops the water from entering the straw?

Remove your finger while the straw is still in the tumbler. What do you predict will happen? Why? What does happen?

With the straw still in the water, again place your finger over the top open end. Remove the straw from the water. What do you predict will happen? Why? What does happen? Do you know why? Record your discovery and state which property of air this proves.

(The water cannot enter the straw while the air is kept in. When the finger is taken away from the end of the straw the water will rise into the straw until it reaches the level of the rest of the water in the glass. When this happens, some of the air inside the straw is pushed out through the top. When the straw is lifted out of the water and the finger is on the top of the straw, the water will stay in because no air can come in the top and the air pressing up at the bottom is strong enough to hold the water in. When the finger is removed the air presses down from the top with as much force as it presses up from the bottom and the weight of the water causes it to drop from the straw.)



Station 7 (Air exerts pressure)

Materials: 2 pieces of paper 9"x12", writing paper and pencil

Directions: Hold two pieces of paper about four inches apart and blow between them. What do you predict will happen? Why? Try the experiment. What happened? Record your discovery and state which property of air this proves.

(The pieces of paper will come together because as the air in the space between the strips moves ahead in one direction, this air pressure will be less that that on the outer sides of the papers.)

Station 8 (Because of its pressure, air gives support to objects)

Materials: String, 4 pieces each 2 feet long, large handkerchief, empty thread spool, writing paper and pencil.

Directions: Make a parachute by tying strings to the four corners of the large handkerchief. Attach the loose ends of the strings to the empty thread spool. Fold the chute around the spool and toss it into the air. What happens? Why? Make your predictions before you toss the parachute into the air.

You may want to try rolling your parachute in different ways to see which will work the best. Record your discovery and state what property of air this proves.

(As an object falls through the air, the air must separate in front of that object, flow around it and close in behind it. The parachute falls slowly because it is not heavy; therefore, it does not have the force with which to push the air from its path.)

SOCIAL STUDIES:

Continue yesterday's lesson. Encourage the students to look for AIR news items in papers and magazines at home. Bring their articles to school to share, then place into their notebooks.

MUSIC:

If you have a set of music books that you use with your class, let the students look for any songs that may pertain to the wind or air. Enjoy singing these songs each day as you work with this Pak.

Suggestions:

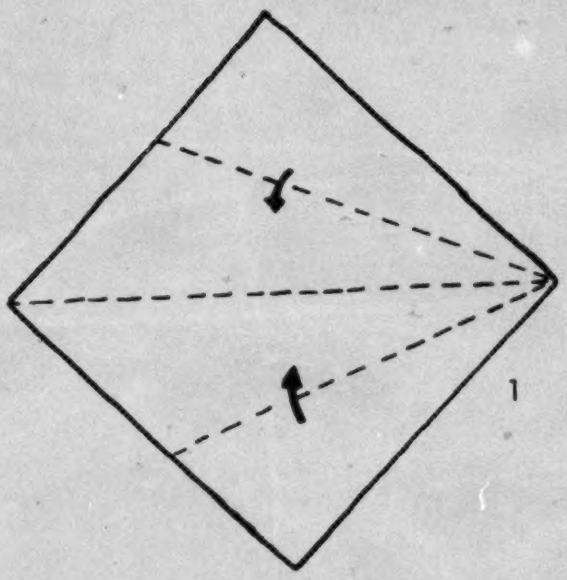
Making Music Your Own, Grade 4, Silver Burdett
Now Let Me Fly, Spiritual, Page 38
Ezekial Saw the Wheel, Spiritual, Page 39
The Little Barn Owl, Page 33
Over the Sea to Skye, Page 108
Open the Window, Noah, Page 124

ART:

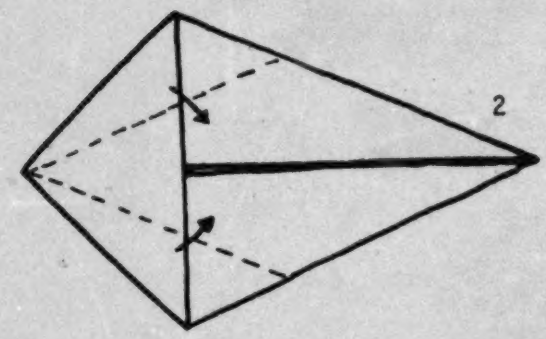
Materials: White construction paper, 9"x9", crayons

Directions: *Flying is a kind of swimming through the air. As a bird flaps its wings, it pushes back against the air, just as swimmers swim in the water by pushing against the water. Could birds fly if there were no air? Why not?* (Discuss)

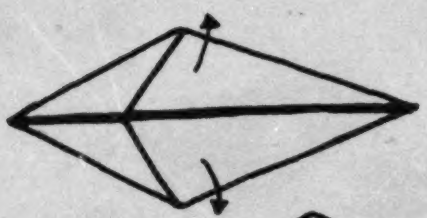
Today we will make a bird by using a Japanese art form. Origami is the traditional Japanese art of folding paper into a variety of objects. We will fold a peahen which is the female peafowl and the male is called a peacock.



1. Fold a square piece of paper into a triangle, crease fold and open out. Then fold as shown in figure one so that the edges meet in the center.

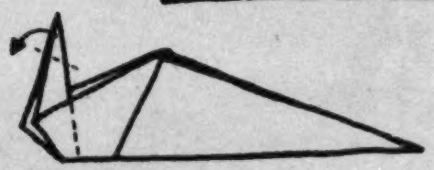


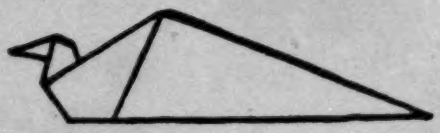
2. Fold as shown in figure two.



3. Fold in half as shown in figure three.

4. Fold neck piece back as shown in figure four. Then open the fold and press with a finger at the base of the fold so that the neck piece folds in between the wings as shown in figure five.





6

5. Repeat this fold for the head, so that the head is folded inside the neck piece as shown in figure six.

6. Draw lines parallel to the body and color as you like.

EVALUATIVE ACTIVITY: Distribute the evaluation test for this lesson. As the work sheet is completed they could work on any of the suggested activities.

SUGGESTED EXTRA ACTIVITIES:

1. Materials: Hard-boiled, shelled egg, empty milk bottle, piece of paper, match.

   Directions: Place a hard-boiled, shelled egg on top of an empty milk bottle. Remove the egg and put a crumpled piece of paper down into the neck of the bottle. Set the paper on fire and push it down inside the bottle. Place the egg on top while the paper is still burning. The egg will pop into the bottle. To remove the egg, blow into the bottle hard. What property of air has been proved?

2. Run across the yard holding a large newspaper in front of you. Run the same distance without the newspaper. Which was easier and was there a difference in your speed? Why?

EVALUATION FOR LESSON 3

DATE _____ NAME _____

WHICH IS BEST?

Circle the best answer to complete each of the following sentences.

1. Air presses on things

   that are flat from the top only from all sides from the inside only

2. My beach ball, when filled with air, differs from when it was empty by

   weighing more weighing less weighing the same weighing 5 times as much

3. Air in my bicycle tires is matter in the form of

   gas liquid solid all of these

4. My desk is matter in the form of

   liquid solid gas all of these

5. Air pressure is the least

   at sea level at top of a mountain in a 10 story building in the atmosphere where jets travel

TRUE OR FALSE?

On the blanks write T if the sentence is true and F if the sentence is false.

1. ____ Air pressure is the property of air that pushes against me.
2. ____ Air presses on me only when I am outdoors.
3. ____ Air in my pocket is a form of matter that has no weight.
4. ____ The pressure of air in my body is equal to the pressure of that column of air resting on my head and shoulders.
5. ____ Air pressure becomes less as you rise above the earth's surface.
6. ____ Warm air is lighter in weight than cold air.
7. ____ When I open my window both at the top and the bottom, the cool air rises and goes out the top opening of my window.
8. ____ My drinking straw is filled with air before I put milk into it.
9. ____ A toy parachute falls slowly because it is not heavy and it does hot have force to push air from its path.
10. ____ Birds could fly if there were no air present.

LESSON 4

CONCEPT: Living things need air to function properly. The great ocean of air in which we live is a mixture of many gases, and is called the atmosphere. There are four layers of air in the atmosphere, -- the troposphere, stratosphere, ionosphere and exosphere.

TIME: One day, interdisciplinary

MATERIALS:

Kit Materials
- Transparency depicting the Earth and the spheres
- Thermometer
- Plastic bag
- Picture of plants and animals
- Map of U.S., to be duplicated for students

Non Kit Materials
- Overhead projector
- Air Resource Center
- Dictionary for each student
- Air notebooks
- Writing materials
- Green plant
- Green leaves from a tree or plant
- Newspapers
- Art Materials: drawing paper, paste, scissors, colored paper
- Making Music Your Own, Grade 4, Silver Burdett and accompanying records, if available

PROCEDURE: ORAL LANGUAGE:

We know that we live at the bottom of a deep ocean and that this ocean is different from oceans we use for swimming or boating. This ocean we live in is more than 500 miles deep. Can we see it? (No)

This ocean is made up of what matter? (Air) *We live at the bottom of this great ocean.*

Write the word atmosphere on board or overhead projector.

What is this word? What does it mean to you? (Discuss)

Atmosphere is another name for air. The word comes from two Greek words. These words mean "vapor" and "place of action". Without this vapor, or gas, living things would die. What does "place of action" mean to you? (Discuss)

Show picture or transparency as you discuss: *The atmosphere is divided into layers - the exosphere, ionosphere, stratosphere and, next to Earth, troposphere.*

Where do you think that atmosphere would be the thickest and have the most oxygen, near Earth or far from it? (Near) *Why?* Discuss.

Where could we breathe the easiest and best? (Near Earth)

All our air, water and food is found inside a little space right around the Earth; it extends only about one mile above and one mile below the earth's surface. This small area we live in is called the biosphere.

Clouds, winds and storms -- or our weather -- occur inside the troposphere and biosphere. Why do you suppose jet planes often fly above the troposphere? (To get above the weather, out of storms.)

How is this great ocean of air held in place? (Gravity that pulls everything toward the center of the Earth.)

The troposphere is the layer of many changes. We call these changes weather. When we look about us we can often SEE changes in the troposphere. What are some changes you have seen? (Clouds, snow, rain, sleet, lightning, etc.)

We can FEEL changes in the troposphere, too. What are some changes you have felt? (Snow, cold, warmth, wind, rain, tornado, etc.)

We can HEAR changes in the troposphere. What are changes you have heard? (Thunder, wind blowing and howling, rain, hail, etc.)

Which layer of the atmosphere is a good place for air travel? (Stratosphere) *Why?* (Planes do not run into storms of the troposphere)

How do you suppose this layer differs from the troposphere? Discuss. (Most of it is very cold, with temperatures as cold as 100° below freezing. There is less air pressure. There is not enough oxygen to breathe. It has a form of oxygen called ozone which shields the earth from harmful rays of the sun.)

If these things are true about the stratosphere, how can man survive in airplanes when they travel in this layer of air? (Planes carry an artificial atmosphere inside the cabins. They are pressurized and carry emergency oxygen masks in case the cabins are punctured.)

The ionosphere is above the stratosphere. The high temperatures in this layer would be unbearable to man. What causes these high temperatures? (Rays of the sun.)

The exosphere is the region farthest away--about 250 miles and beyond. Scientists know very little about this region. Only rockets and radar have reached the exosphere so far.

Write this statement on board. "Living things need air to function properly."

What does this statement say and do you agree with it? Why or why not? (Discuss and give examples.)

LANGUAGE ARTS:

READING: *From your research reading today prepare a report on either the earth's atmosphere or how living things use air to function properly. You will read your reports to the class when we are finished.*

SPELLING:

Dictionary Skills:

Take your alphabetized spelling list and do further study of your AIR words. Use your dictionary and mark the accents and syllables, then write the sound spelling and meaning of as many words as you can before my buzzer rings.

Let us do the word liquid together. Find in in your dictionary. On what page have you found it? In what column and what are the guide words on this page? Tell me how to divide liquid into syllables. (Demonstrate on the board.)

liq-uid = lik'wid, a substance that is not a solid or a gas.

There will probably be more than one meaning for each word, but you need write only one meaning. Add these words to your glossary.

At the end of your specified time have a class discussion. Some students may show at the board what he has learned about one of his words.

ENGLISH:

Read some air riddles to the class.
Examples:

1. *What is it that you can touch*
   But can not feel;
   That has no size nor shape
   But still is real?

2. *You cannot see it.*
   You cannot taste it.
   You cannot smell it.
   And--you cannot live without it.
   Elephants and tigers,
   Fish and birds,
   Butterflies and snails,
   Even snakes and worms--
   No animal can live without it.
   No plant can live without it.
   What is it?

Let the class compose a short riddle together, then direct each student to compose his own air riddle. When completed, let them work in pairs, editing each other's work. Share with the class and place corrected riddles into their folders.

MATH:

Sometimes air is hot, sometimes it is cold. Sometimes air is moist because there is much water vapor in the air. Sometimes air is dry. What would cause it to be dry? (There is very little water vapor in the air.)

The air around us changes from day to day. Can we feel these changes? How could we measure these changes? (By using thermometers.)

From your research reading you discovered that cold, dry air is heavy and has a high pressure and warm air is light and has a low pressure. Where would we find the warmest air in our classroom? Where would we find the coolest air?

What do you suppose carries the clouds of moisture that become rain? (Air)

What is wind? (Moving air)

What is weather? (Clouds, winds, storms, rain, etc.)

Describe our weather today. (Discuss).

How could we determine the temperature of the air outside our classroom? (By placing a thermometer outside.) Two volunteers take a thermometer outdoors and note the change of temperature from that in the room.

How could we find out what the temperature was in Chicago yesterday? (By checking the weather section in daily newspapers.)

How much do you suppose the temperature changes each day on our school ground? By using a thermometer and a daily newspaper, let us investigate.

1. Use a thermometer to measure the air temperature outside our room four times each day. Do this at 9:00 A.M., at 11:00 A.M., at 1:00 P.M., and at 3:00 P.M. Do this for 4 days. Keep records of our findings. Different volunteers will do the checking each time and report to the class.

2. Use the weather record in your daily newspaper to find out the low temperature for each of the nights.

3. Make a graph of these temperatures. (If graphs have not been studied yet, this would be a good time to introduce this skill.)

4. Keep a record of whether the sky is partly cloudy, cloudy, or clear.

SCIENCE:

We said earlier today that living things need air to function properly. Do you really need air? Let's try an experiment to see if you really DO need air.

Experiment: *Pinch your nose and close your mouth while I count to 10. Now tell how you feel without a supply of air.* Discuss.

Try holding your breath as long as you can. Raise your hand when you need to breathe again.

Feel your body and find your ribs. Now notice how your chest expands when you inhale and contracts when you exhale.

Could you kill yourself by holding your breath? (No, you would faint and automatically start breathing again.)

How long could you live without air? (Brain damage begins in five or ten minutes.)

The atmosphere is made up of many gases mixed together. What are the two gases that make up most of the air? (Oxygen and nitrogen) *Some other gases are in the air in very small amounts. Oxygen could be called the "gas of life". Why?* (Without it there would be little or no life on earth.)

Show a green plant. *This green plant needs something from the air. What is it?* (Carbon dioxide, a gas found in the air.)

How does this plant take in carbon dioxide?

Distribute green leaves for the class to examine, along with the plant.

Green plants have tiny openings on their leaves which can take in carbon dioxide. The plant mixes the carbon dioxide with water to make sugar or food for growth. The process by which plants use sunlight, water and carbon dioxide to make food is called photosynthesis.

What does this plant put into the air that humans and animals need? (Oxygen)

What do humans and animals put into the air that plants need? (Carbon dioxide.)

How is oxygen, the "gas of life", formed so that animal life will have a sufficient supply? (Discuss) *Oxygen is formed by the process of photosynthesis. Most of the oxygen in our atmosphere was made by either green plants growing in the earth, or tiny green plants called photoplankton, that grow in ocean water. These tiny plants produce well over half of Earth's oxygen.*

Animals breathe in oxygen and breathe out carbon dioxide. Green plants absorb carbon dioxide and give off oxygen and small amounts of carbon dioxide. This way plants and animals supply needed gases for each other.

Experiment: (Plants need air)
Place a plastic bag over a plant to cut off all air. *What do you predict will happen?* (It will die.) *Why do you make this*

prediction? (No air is reaching the plant.)

Observe for several days and record the results.

Show a picture of plants and animals. Explain what is happening to the air.

SOCIAL STUDIES:

Materials: Newspapers, Air notebooks, drawing paper, paste, scissors

Directions: *Cut out from your newspapers all stories that have to do with weather. Make a map of the United States showing in what states or cities this weather is occurring. We will share your other AIR articles and you will paste them into your AIR notebooks.*

Use two days for this lesson.

MUSIC:

Listening to Brass Instruments.

Silver Burdett's, Making Music Your Own, Grade 4, has the brass instruments illustrated on page 19.

Discuss the names of the brass instruments. Perhaps someone knows how a tone is produced. (The player buzzes his lips into the mouthpiece and causes the air inside the tube to vibrate.)

Listen to a musical recording and try to match the sounds to the brass instruments.

Suggested record:

Dance from Folk Suite -- Lyndol Mitchell

This music was composed for a quartet of brass instruments -- two trumpets, a French horn and a trombone.

This record is included in the set of accompanying records for Making Music Your Own, Silver Burdett.

ART:

Materials: Colored paper, drawing paper, crayons, glue, scissors

Directions: Make an illustration that shows the earth and the four layers of air in the atmosphere. Label each layer. Add any facts or information that you know about each of the layers.

OR

"Living Things Need Air"
Make a picture to prove this statement. Use any of the art materials you wish. You may want to work with a partner and make a mural.

EVALUATIVE ACTIVITY: Distribute the evaluation test for this lesson. As they complete the work sheet they could work on any of the suggested activities.

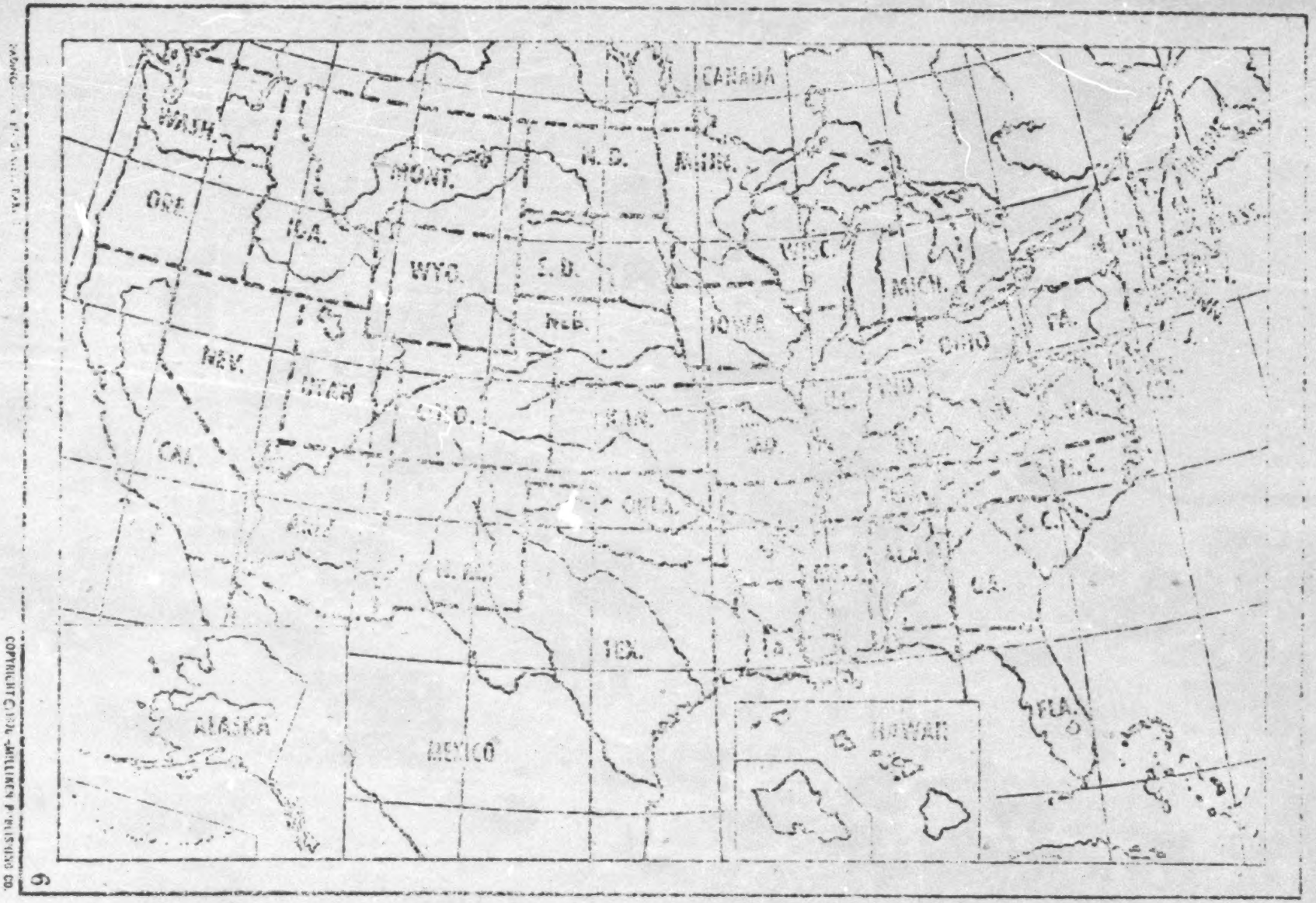
SUGGESTED EXTRA ACTIVITIES:

1. Construct a model of a leaf section. Use clay, styrofoam or foam rubber. Show by color or other method how and where the leaf produces oxygen.

2. Find out what "air" is made of.
Which chemical elements are present?

3. Draw or paint a picture of an earth in which there is no oxygen and no carbon dioxide.

UNITED STATES



COPYRIGHT © 1974 - MILLIKEN PUBLISHING CO.

EVALUATION FOR LESSON 4

DATE _____ NAME _____

WHICH IS BEST?

Circle the best answer to complete each of the following sentences.

1. Another name for the ocean of air around the earth is

   vapor gravity atmosphere ocean

2. The atmosphere is divided into

   oceans spheres wind weather

3. We live in a layer of air called

   ionosphere exosphere troposphere stratosphere

4. Airplanes often travel in the stratosphere because there is

   more oxygen more gravity better weather warmer temperature

5. These are the two gases that make up most of the atmosphere

   nitrogen ammonia oxygen carbon dioxide

TRUE OR FALSE?

On the blanks write T if the sentence is true and F if the sentence is false.

1. ____ When air is moist there is much water vapor in the air.
2. ____ We can see and feel changes in the weather, but we never hear any changes.
3. ____ The high temperatures in the ionosphere would be unbearable to man and are caused by the moon.
4. ____ Most of the oxygen in the atmosphere was made by green plants.
5. ____ Photoplankton are green plants that grow in wooded areas.
6. ____ I can measure the air temperature by using a barometer.
7. ____ Oxygen could be called the "gas of life".
8. ____ The tiny green plants that grow in the ocean produce over half of earth's oxygen.
9. ____ Green plants need carbon dioxide from the air.
10. ____ We could live comfortably if there were no green plants.

LESSON 5

(Designed for 3 days)

CONCEPT: Air works for us, but the amount of air we have and can use on Spaceship Earth is limited.

MATERIALS:

Kit Materials
Transparency of story starters
Thermometer
Straws

Non Kit Materials
Overhead projector
Dictionary for each student
Writing materials
Air notebooks
Air Resource Center
U. S. wall map
Newspapers
White construction paper 9"x12"
Variety of colored tempera paints
Volunteers from 5th and 6th grade instrumental class with their wind instruments.

FIRST DAY

PROCEDURE: ORAL LANGUAGE

What would be your guess as to whether or not there are enough supplies on Spaceship Earth to maintain life indefinitely? What two supplies do you consider the most important? (Discuss)

Would you like to act as a crew member or as a passenger aboard Spaceship Earth? Why? Which do you consider to be the most important? (Discuss)

Scientists feel that soon all life will come to an end aboard this Spaceship unless the crew takes quick action! Living on any Spaceship requires the crew to use life-support materials wisely and make them last as long as possible. (Discuss, give examples from our space program.)

Our supply of air is limited.

Do you feel that this is a true statement? Why or why not? (Discuss)

Write the word resource on the board.

What is this word and what does it mean? (Any supply that will meet a need.)

What are some natural resources that we have on Spaceship Earth?

Do you consider air a resource? Why?

Not too long ago air was considered to be a renewable resource of the environment. It was believed that the supply of pure fresh air was practically inexhaustible. In recent years man has come to realize that he is rapidly polluting this inexhaustible air.

Yesterday we learned that only the bottom layer of air surrounding Spaceship Earth is dense enough to be useful. What layer is this? (Troposphere)

Then there is a very small area in which we live. It extends only about one mile above and one mile below the earth's surface. What is the name of this small area? (Biosphere)

What produces the oxygen that humans and animals need from the air? (Green plants on land and photoplankton in the water.)

Are there ways that these plants could be destroyed? (Discuss)

If these plants were to be destroyed in large numbers what would happen to the air on Spaceship Earth? (Discuss)

How are these plants being destroyed? (By water pollution, by clearing the land and building shopping centers, factories, more roads, etc., and by forest fires.)

READING

We use air all the time -- in many ways. Air works for us. Air is elastic.

How can these statements be true? (Discuss)

In your research reading today you will find facts that will both explain and prove these truths.

SPELLING

Materials: Copies of Spelling puzzle, Keyword Puzzle, pencils, dictionaries

Directions: Distribute to each student a copy of the Keyword Puzzle.

Today you will solve the spelling puzzle titled Keyword Puzzle.

Read and discuss directions with the class.

When you have completed the puzzle, choose some air related words that you consider important and that you want to include in your glossary. Look up their meanings and enter them in your glossary.

ENGLISH

Materials: Transparency of 3 story starters, writing materials

Directions: Read the story starters together. Each student selects one of the story starters, illustrates and writes a story of at least two paragraphs.

When completed, work in pairs, editing each other's work.

Transparency includes:

STORY STARTERS

1. Drifting on a Cloud

What could be softer than a cloud? Take a ride on one and see. How did you get on? What do you see? How will you get off?

Try these words:

drift	travel	arial	atmosphere
float	fluffy	billowy	view

2. The Wind

Think about the wind. What does it sound like? Write a story about the wind causing destruction, or sailing ships, or flying kites.

Try these words:

roar	hurricane	tornado	cyclone
sound	pressure	whistling	velocity

3. The Big Bubble

You are walking home from school, and suddenly a big bubble lands at your feet. It wraps itself around you. It lifts you up in the air. Write the story of what happened.

Try these words:

huge	filmy	bubbly	transparent
giant	smooth	soapy	

MATH:

For the second day, students record the temperatures of the air outside the classroom.

Use overhead projector or blackboard as you present story problems which are related to air, wind or air pollution.

Examples: A catamaran is sailing through the water at 15 miles per hour. The wind blowing on its sails is moving twice as fast. How fast is the wind moving? (30 miles per hour)

One inch of rain can be equal to 10 inches of snow. Suppose your area had 3 inches of rain on a fairly warm day in winter. How much snow could have fallen if the temperature had been lower? (30 inches of snow)

The average summer and winter temperatures in San Francisco are 63°F and 50°F. In Denver they are 86°F and 43°F. In Philadelphia they are 77°F and 34°F. Make a bar graph showing the summer and winter temperatures in these cities. Use different colors for the summer and winter temperatures.

Some thermometers are marked in the Fahrenheit scale. Others are marked in the Celsius scale. You can change Fahrenheit readings to Celsius readings by using this formula:

$$C = 5 \times (F-32) \div 9$$ (Write it on the board)

Suppose your thermometer had a reading of 212°F. Using the formula, what would be your reading in degrees C? (100 degrees)

SCIENCE

Write the word category on the board.

What is this word and what is its meaning? (A division in a system of classification; a class.)

Air works for us in so many different ways, it would be helpful if we could list them by categories. What categories would you suggest? (Discuss)

Suggested categories and lists:

1. Air helps provide transportation.
   - Pushes sailboats
   - Makes a jet plane zoom off
   - Helps a glider fall
   - Aids parachutes
   - Dirigibles travel through the air.

2. Moving air works.
   - Turns windmills to pump water and grind corn and wheat into flour.
   - Changes the surface of the earth
   - Carries seeds and pollen
   - Business people such as owners of gasoline stations, car dealers, etc. use wind to spin colorful displays
   - Helps make soil. Wind blows broken pieces off the rocks. It blows rock pieces against each other. They grind together like teeth, getting smaller and smaller, eventually becoming soil.

3. Squeezed air works for us. (Air is squeezed when it is pumped into something. The more air that is pumped in, the more the air is squeezed.)
   Used in brakes to slow down and stop the turning wheels of trains, trucks, buses, airplanes and cars.
   Used in heavy air drills to break up streets and roads for repair work.
   Used in sand-blasting machines to clean outside walls of buildings.
   Jewelers use it in air bulbs to blow away dust in watches.
   Gardeners use it in plastic containers to blow powder on plants.
   Spray painting guns help painters.
   Musicians use it when they play accordians.
   Tires are pumped up with squeezed air.

4. Air supports fire which works for us.
   Furnaces burn to keep us warm.
   Campers use campfires for cooking.
   Barbecues cook food outdoors.
   Candles give light and decoration.
   Most engines are run by power from some kind of fire.
   Fire helps make things we use. Things made from plastic and metals are made with the help of fire.
   Smokers use matches or lighters.

5. Air works in our homes.
   Dries clothes, outdoors or in electric dryers.
   Pushes dirt into vacuum cleaners.
   Egg beaters beat air into eggs and batter so we can bake.
   Pushes liquids up into straws so we can drink milk, soda, etc.
   Makes medicine go up into medicine droppers.
   Air conditioners keep us cool in summer.
   Hair dryers dry our hair.
   Air mattresses for sleeping.
   Helps empty fish tank when it needs cleaning.
   Dip tubes can take objects out of water.

6. Air makes Spaceship Earth beautiful.
   Without air beautiful birds could not fly.
   Makes it possible to have beautiful plants.
   Brings in fresh, clean air.
   Carries away and scatters air polltuion.
   The colors of sunset are made by sun's rays striking the atmosphere.
   The sounds and smells of the seasons are carried by the air.
   Insects fly through the air.
   Air brings the rain clouds.
   The sun shines through the air.
   Air brings beautiful snowflakes.
   Protects us from bits of rock and star dust falling through space.
   Helps produce music for us to enjoy.

7. Some toys work because of air.
   - Pinwheels
   - Toy gliders and planes
   - Kites
   - Variety of balls
   - Balloons
   - Pop guns
   - Air in tires for bicycles and wagons
   - Blowing soap bubbles

8. Air is necessary to sustain life.
   - Oxygen tanks for patients
   - Oxygen tanks for divers
   - Oxygen to pressurize planes
   - Air is pumped into diving bell as men work under water.
   - Air in submarines.
   - Rafts used to save lives.
   - Mouth to mouth resuscitation
   - Plants grow to produce food and oxygen for man and animals.

9. Air is weather.

   Weather is the condition of the air over a certain region at any one time. It is important to us all. It can affect our lives.

   Air masses -- Air usually moves in large bodies called air masses.

   Air moves clouds. A cloud starts out as moist air. As this air cools moisture begins to form tiny drops. They cling to bits of dust in the air. They roll up like smoke. Clouds at night act like the covers on your bed--keeping the air from losing much of its heat, so on a cloudy night will the air temperature drop much? When there are many clouds during the day some of the sun's rays will not reach the earth. Will the temperature rise much on such days?

   Changes in air pressure, or weight of air pressing on the earth, indicate a change in the weather. When the air pressure falls, warmer weather with rain is usually on its way. When air pressure is rising stormy weather follows but clearing may be on the way. Many instruments help the weatherman in his study of the weather. Thermometer measures temperature of the air. Barometer measures air pressure. Weather vane tells which way the wind is blowing. Rain gauge measures rainfall. Anemometer measures wind speed. Hygrometer measures humidity, or moisture content of air.

Divide the class into nine groups. Each group will be assigned one of the nine categories you have discussed with the class. If they complete a study of one category, they may elect to do another if time permits.

You will do research on the category assigned to your group. When your research is completed, design one or more experiments that will prove some facts within your category. Your information and experiments may include any information which you think is important.

What are some materials you may find helpful in making your presentation to the class? (Pictures, drawings, any of our film strips which you have previewed.)

For your experiments you may use materials from our classroom, from the kit, or bring needed items from home. When your research and experiments are completed, decide on two questions which you think the class should be able to answer after hearing your presentation. The questions can be true or false, or multiple choice, with three or four choices. Example:

We can find squeezed air in
clouds bicycle tires . rain

Write out your questions, along with the correct answers and give them to me. When we have completed our AIR unit, these questions will be included in a test to be given to the class.

The suggested list of reference books will provide good material for this lesson.

SOCIAL STUDIES

Conclude yesterday's lesson - showing weather conditions on U.S. map.

MUSIC

If you have an instrumental music program in your building, invite the instructor and some students to come to your room to demonstrate how sounds are produced on wind instruments, both the woodwinds and brass. Encourage a question and answer session while the demonstrators are still with you.

Stimulate their creative thinking by asking, *Could you make a type of wind instrument? Think about this. What materials might you use? Where could you look to find help or ideas to perform such a project?*

There may be volunteers who would be interested in doing research reading and attempting to make a wind instrument.

ART

Materials: Straws, white construction paper 9"x12", black tempera paint, a variety of colors.

Directions:

We have discovered many ways that we use air and many ways that air works for us. Today we will use air when we work as artists. Can you think of any ways we could use air as we make a picture? (Discuss)

Straw paintings look strange. You will need white or colored paper and a straw. Use one or more colors of paint. Pour a little paint on your paper, then begin to blow through the straw. Blow on the paint, chasing the paint all over the paper by blowing on it. Do not blow too hard. The paint will make little lines. You may make lines all over the paper. The more lines you make, the fancier it looks. The paint must be dry before you hold up your painting.

KEY

LESSON 5
(First Day)

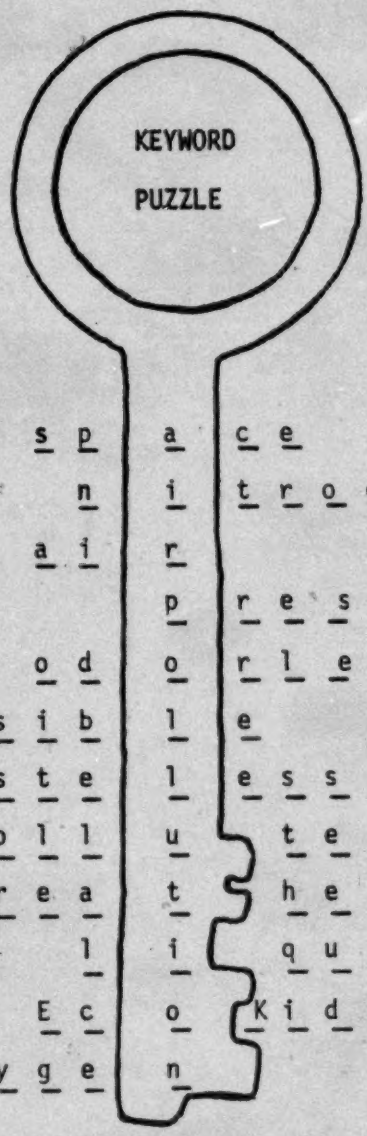
Date _____ Name _____

KEYWORD PUZZLE

To find the two key words read the letters in the key.

CLUES

1. A property of air, -- air takes up _____.
2. A gas found in the air.
3. This kind of ocean surrounds the earth.
4. A property of air -- air exerts _____.
5. Another property of air -- having no smell.
6. This property of air is an antonym for visible.
7. A property of air -- having no taste.
8. What man does to the air.
9. One way animals use oxygen.
10. A state of matter.
11. These Kids are friends of plants and animals.
12. Plants put this gas into the air.



1. s p a c e
2. n i t r o g e n
3. a i r
4. p r e s s u r e
5. o d o r l e s s
6. i n v i s i b l e
7. t a s t e l e s s
8. p o l l u t e s
9. b r e a t h e
10. l i q u i d
11. E c o K i d s
12. o x y g e n

Write two sentences using the key words.

_____

_____

SECOND DAY

READING

Small group study and research on assignments made in Science class yesterday. Use the visual aid centers and resource library which have been set up in the room.

SPELLING

Add more words and definitions to their glossaries.

ENGLISH and ART

Rewrite their stories after they have been corrected. Illustrate their stories. Share with class and place in folders.

MATH

This is the third day for recording the temperature of the air outside the classroom.

Continue story problems as presented in yesterday's lesson.

Example: A tornado destroyed 576 buildings in Virginia, 243 in Ohio, 1,079 in Kansas and 806 in Missouri. How many buildings did the tornado destroy in that one day? (2,704) How many more were destroyed in Missouri than in Virginia? (230) How many more were destroyed in Kansas than in Ohio? (503) If you know the total number destroyed in all of the states, how can you determine the average number destroyed in any one state? (2,704 ÷ 4 = 676)

Tomorrow you will create a story problem relating to Air. Perhaps you can write one at home tonight and bring it to Math class tomorrow. As you write your problem try to include more than one process, addition, subtraction, multiplication and/or division.

SCIENCE

Assigned groups work together doing research and gathering materials for their experiments.

SOCIAL STUDIES

Share their maps and news stories. Discuss the various news articles, making comparisons and deductions as to why there are differences in weather throughout the United States.

THIRD DAY

READING

Continue working in assigned groups, doing their research. Near the close of the period some groups may be ready to make their presentations. The others will present their during Science class later today.

SPELLING

Continue working on their glossaries.

As they complete this assignment they may begin to design spelling puzzles and games.

Suggestions: design a crossword puzzle, password game, scrambled words, game of lotto, riddles, air sentences to be unscrambled (example: pressure Air weight has exerts and). Encourage them to use their spelling list pertaining to Air. Work with partners or in small groups if they wish.

ENGLISH and ART

Those who have completed their stories and illustrations may work on suggested extra activities.

MATH

This is the fourth day to measure and record the temperature outside the classroom.

Yesterday I posed story problems relating to Air. Who has a story ready to present to the class today?

If no one is prepared, give the class time to write a story problem, then volunteers may use the overhead projector or blackboard to present his story to the class. Class members will solve the problem at their desks.

SCIENCE

Groups will make their presentations to the class.

SOCIAL STUDIES

If you have secured a speaker for tomorrow's lesson, review with the class who it will be, and what questions could be asked.

Suggested lesson if you have not secured a speaker:

You will work in teams and act out charades. You will act out something that air does for us and other class members will try to discover what task you are representing. Divide the class into teams of about 5 members each.

EVALUATIVE ACTIVITY:

Edit the questions submitted by class members. Go over the tests with the writers if changes are necessary. Compile the questions into one test to give to the class.

Their presentations, too, will serve as an evaluative activity for this lesson.

SUGGESTED EXTRA ACTIVITIES:

1. Look up the different kinds of clouds. Make a large mural showing the main kinds of clouds. Place the clouds at different altitudes. Make labels showing the altitudes and names of the clouds. Show the kind of weather that comes with each cloud.

2. Observe the sky twice a day for a week. Make a record of the kinds of clouds that appear in the sky each day. Make a note of the kind of weather that comes along with the clouds and the kind of weather that follows. Report to your class.

3. Design two pictures. One will show what air does for us today, the other will show what air will do for us 20 years from now. Use your imagination and be creative, designing things that have not happened yet.

4. Look around your house and your garage. Make a list of everything that uses air to make it work.

LESSON 6

CONCEPT: Polluted air is air that contains impurities. Most air pollution is caused by man and harms life and property on Spaceship Earth.

MATERIALS:

Kit Materials

Transparencies:
1. Particulates-House dust
2. Particulates-Train smoke
3. Gases-Cars and Buses
4. Caveman
5. Temperature inversion

Candle
Tile
Tweezers
Glass slide
Vaseline
Magnifying glass
Flashlight

Non Kit Materials

Overhead projector
Air Resource Center
5 bean bags or 5 small balls of yarn
Writing materials
Air notebooks
Clay
Tape
Vacuum cleaner (from janitor)
Facial tissue
Dirty furnace filter
Piece of nylon stocking
Cardboard frame
Guest speaker
Making Music Your Own, Gr. 4, Silver Burdett and accompanying records
Art materials: crayons, water colors, cut paper, materials for collage

PROCEDURE:

ORAL LANGUAGE

Listen carefully and write down the answer to this riddle:

I seem like nothing but I have weight.
I have no color, no smell, no taste.
You can feel me, you can push me,
Without me you would live in a silent world.
I am necessary; I am dangerous.
You control me--I control you,
I follow you, you follow me.
What am I? (Air)

Did you ever hear anyone say, "I am going for a drive in the clean country air?" What did they mean? Is the country air always clean? Is it dirtier than city air? Why? (Discuss)

Does anyone have another word for "dirty" air? (Pollution)

For many years people thought air pollution was caused only by smoke and soot. Now we know that polluted air contains many other things. Let's investigate and discover what polluted air contains.

You could show any related visual aids at this point. Follow with a discussion.

There are two main groups of air pollutants, particulates and gases. Particulates are made up of many tiny particles. These particles are too small to be seen by themselves. We can see them when there are many of them together. What are causes of particulates? Discuss. (Smoke, soot and dust) Show transparencies, "Particulates - House Dust" and "Particulates - Train Smoke".

What are some gases that pollute the air? (Sulfur dioxide, carbon monoxide and hydrocarbons) *What puts these gases into the air?* Discuss.

The burning of coal and oil puts sulfur dioxide into the air. Gasoline engines give off carbon monoxide and hydrocarbons. These gases are harmful to living things. Show transparency - "Gases - Cars and Buses".

Which of these two main groups of air pollutants is easier to see? (Air pollution caused by particulates. Air pollution caused by harmful gases is often hard to see, and, because these gases are hard to see, they can be more dangerous.)

When do you suppose man began to pollute the air? (Discuss)

Show transparency, "Caveman". *The first time cavemen built a wood fire to keep warm was the first time people dirtied the atmosphere. Smoke and soot from these fires polluted the air. Only a small number of people were living on the earth, so their fires did not dirty the air very much.*

When and how, then, did our Spaceship Earth begin to have serious air pollution problems? Discuss.

As the earth become more crowded with people, more fires were needed. People learned to use coal and oil for fuel. But burning these fuels put more harmful materials into the air.

As time went on, our industries began to grow and people found more ways to use machines. They discovered how to get more power from burning various fuels. What were invented that needed to burn these fuels? (Trains, automobiles and airplanes) *These changes were a great help to people, but they made the air dirtier.*

Where does electricity come from? Discuss.

We know that electricity isn't magic and that is doesn't grow on power lines. Power plants burn much fuel to produce electrical energy. Much of that fuel goes up in smoke, polluting or dirtying the air.

What do you see in our classroom that uses electricity? (Electric lights, overhead projector, filmstrip and film projector, electric clock, etc.)

What electric appliances do you have in your home that cause air pollution because they use electricity? (Possible answers: electric

tooth brushes, iron, stove, egg beater, washing machine, clothes dryer, hair dryer, can opener, clocks, vacuum cleaner, lights, electric typewriter, toaster, refrigerator, radio, T.V., etc.)

LANGUAGE ARTS

READING

We will do research reading on the various types of air pollution, their causes and what is being done to prevent such pollution. Prepare reports, and in these reports add a paragraph telling how Eco-Kids can help clean the air on Spaceship Earth. We will use two days for reading and preparing reports. The third day we will read and discuss the reports.

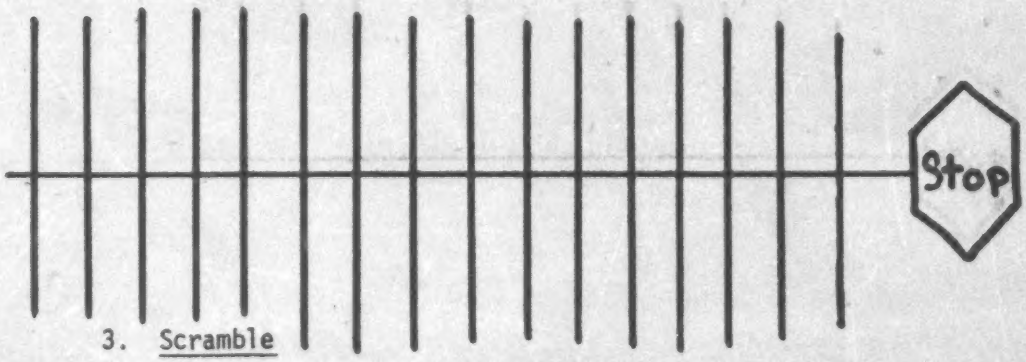
SPELLING

1. Word Throw

   Divide the class into groups of 7 members each. Place each group in a different part of the room. One member stands in front of his group and tosses a bean bag or small ball of yarn to a child sitting in the half circle. As he tosses the ball, he calls out a word which the catcher must spell. If the catcher spells the word correctly, it is then his turn to toss the ball. If the catcher cannot spell the word correctly, the tosser picks another child, tosses the ball to the new child, and repeats the word which has not yet been spelled correctly. This is repeated until a child answers with the correct spelling. He then becomes the tosser.

2. Stop and Go

   Each child draws on his paper a street leading to a stop sign. Divide it into many blocks. At a signal, everyone writes as many AIR words as he can remember, one word in each block. At the word "stop", each child counts up the number of words he has written. One with most correct words wins.



3. Scramble

   On the board, scramble some of the Air words. Let the class be detectives and unscramble the words. Those who finish before you say "stop" can earn extra points by writing sentences using any of the words.

ENGLISH

Haiku is a Japanese form of poetry in which syllables are counted. The first line contains 5 syllables. The second has 7, and the third has 5.

Write this poem on the board or overhead:

Smog
Stinging at your eyes
A grey blanket in the skies
Product of progress.

Read the poem together and check the number of syllables in each line.

What kind of poetry is it? (Japanese, called Haiku)

What form of art did we use when we made our birds? (Japanese form of art, using folded paper)

What are some other titles pertaining to air or weather that we could use as we compose a Haiku? (Rain, wind, pollution, air, etc.)

Let the class select a title, and together, compose a Haiku. Write it on board or overhead.

Instruct the students to compose one alone, or work together in pairs. After the poems are edited and rewritten, share with the class and place into their folders. They may wish to illustrate their poems.

MATH

Students will complete their graphs showing the air temperatures of the past four days.

Answer these questions:

1. What was the highest daytime temperature during the 4-day period?
2. What was the lowest daytime temperature during the 4-day period?
3. What was the greatest temperature change during any one day-and-night period?
4. How did the clouds seem to be related to the temperature each day?

SCIENCE

Go outside and look at the sky, (or use classroom windows).

Is the sky clear or does it seem hazy or dirty?

If it does not seem clear, what do you think made it dirty?

If the air is blowing would the air be cleaner than on a day with no wind? Why? (Yes, the wind would carry away the pollution.)

If it is raining does the air seem cleaner or dirtier than when it is dry? Why? (Rains will wash away the pollution.)

Now have you discovered what effect weather has on air pollution? Discuss. (Rain and snow wash away impurities, wind blows it away.)

How does warm air help pollution? (Air rises and takes impurities along with it.) *Where is warm air and what causes it to be warm?* (Air near the ground is heated by the earth's surface. This heated air rises and is pushed up by the heavier cool air.)

If you placed your hand over a hot radiator what would you discover about the movement of the heated air? (It rises.)

What happens to the weight and temperature of the warm air as it rises? It becomes heavier and cooler. Then it sinks back down to the ground.)

What happens to it when it is near the earth's surface again? (Becomes heated and rises.)

The motion of the air was once able to pick up and scatter the pollutants in the air. In some places many automobiles and industries are crowded together, and the motion of the air cannot remove the pollutants fast enough. What happens to the air in these places? (It is always polluted.)

We know that warm air rises and takes impurities with it, but sometimes this isn't possible. Let's try to understand why this isn't always possible.

As inversion conditions are explained show the "inversion" transparency. *Inversion means that something is upside down. An inversion layer of air is hot air that is formed at a fairly high altitude. It is hotter than the air near the earth's surface and causes the air near the surface to be trapped where it is. It cannot rise because the air above it is hotter than it is. Nitrogen dioxide and unburned hydrocarbons will be trapped for days at a time. This is called a temperature inversion and during this inversion the air becomes more and more polluted. Why?* (Pollutants near the ground are trapped there. The warm air cannot rise.)

What damages do you suppose these inversions have caused? Discuss.

Temperature inversions have caused deaths in many large cities. In 1952, 4,000 people died from air pollution in four days in London, England. In 1948, 6,000 people in Pennsylvania became ill, and 20 died from air pollution. Air pollution is a killer. Besides causing death to people what other harm does it cause? (Kills plants and animals. Ruins buildings, clothes and belongings.)

What is smog and how is it formed? Discuss

Sunlight "cooks" the mixture of hydrocarbons and nitrogen dioxide formed by gasoline powered engines. This "cooking" makes other gases which are called smog. It is found most often in sunny climates where there is heavy automobile traffic. Is it present during a temperature inversion? (Yes)

Have you ever been in heavy smog? Where? How did it make you feel? (Eyes begin to burn and run and breathing becomes more difficult.)

The more we pollute the atmosphere the more we hurt ourselves. Do you agree with this statement? Why? Discuss.

Now we will try some experiments to discover how air becomes polluted and how we can determine what pollutants are in the air.

Experiments:

1. How Does Smoke Dirty the Air?
   Materials: candle, tile, clay, matches, tweezers

   Procedure: Stand the candle in a piece of clay.
   Carefully light the candle.
   Pick up the tile with the tweezers and hold it about 1 inch above the flame. Keep the tile above the flame for about one minute.
   Remove the tile from the flame, allow to cool and then examine the tile.

   What do you see? What kind of pollution was made by the burning candle? What does this kind of pollution do to the environment? Can you think of some things that put this kind of pollution into the atmosphere?

2. Air Contains Smoke and Soot.
   Materials: glass slide, vaseline, tape, magnifying glass

   Procedure: Smear a glass slide with a thick layer of Vaseline and tape it outside on the window sill. Leave it for a few days, then take the slide in, put it on a piece of white paper and study it under a bright light using a magnifying glass.

   What do you predict we will find on this slide after we bring it into the classroom? What kind of pollution will this be and what caused it to be in the air? Discuss.

3. Air Contains Dust
   Materials: classroom and slide projector light

   Procedure: Pull down the shades of the classroom, switch off the lights and turn on a flashlight or a slide projector light. Little specks of dust will be dancing in the beam of light.

You can often observe dust particles in a ray of sunlight that comes through the window.

What are we seeing in the air? What has caused this pollution to be in the air? Discuss.

4. Air Contains Dust.
   Materials: Tank type vacuum cleaner, facial tissue, magnifying glass, flashlight

   Procedure: Take a tank type vacuum cleaner and tape a piece of tissue over the end of the hose. Hold the hose up in the air and turn on the machine. After several minutes, switch off the vacuum, remove the tissue carefully, and look at it under a bright light with a magnifying glass.

   What pollution do we observe and where has it come from?

5. Air Contains Dust.
   Materials: Dirty furnace filter (a volunteer may bring one to school)

   Procedure: Show a dirty furnace filter.

   What type of pollution is this and what caused it?

6. Cars Cause Air Pollution

   Procedure: *Count a specific number of automobiles that go by your house this evening. Note the number with excessive exhaust fumes and report to class tomorrow.*

7. Test for Polluted Air.

   Procedure: Ask each child to hang a clean white handkerchief or cloth on a clothesline at home or outside his bedroom window for 48 hours. Ask them to bring in their cloths. Tack them to a bulletin board. Are some dirtier than others? Is air pollution heavier in some areas?

8. Test for Damage to Fabrics.
   Materials: Piece of nylon stocking, cardboard frame, tape

   Procedure: Tape a piece of nylon stocking into a cardboard frame and hang it outside your classroom window. After a few days or week, project it with the overhead projector. Do the same after two weeks and three weeks. Note pollution-caused deterioration.

   What do you predict will happen to the nylon stocking?

SUMMARY

Anything that burns something can cause air pollution. Make a list of everything you can think of that causes air pollution. Let us see who can make the longest list. Compare and discuss the lists when completed.

Lists can include - cars, buses, trucks, tractors, incinerators, factories, power plants, trains, airplanes, burning garbage, forest fires, camp fires, outdoor barbecues, all electrical appliances, etc.

Air pollution is harmful. How is air pollution harmful? List as many ways as you can think of that air pollution is harmful. Again, let us see who can make the longest list. When completed, compare and discuss the lists.

Lists can include:

Kills and harms plants and trees, farmer's crops and gardens. Then these plants cannot produce the food they need to live. This in turn prevents production of food for man and animals.

Harms people, affects heart and lungs, causes coughing and eyes and noses to burn and run.

Kills people.

Materials: nylon clothing and rubber products may fall apart. Corrodes metal and paint on buildings. Paper, leather and other fabrics are destroyed. Stone statues and monuments wear down more rapidly.

SOCIAL STUDIES

1. Your guest speaker will make his presentation.

If you have not secured a speaker, this is a suggested lesson:

REACTIONS (either oral or written)

You have been assigned to another country to report on their air problems.

1. *Tell where you are and how a strong wind is affecting the area.*

2. *Tell where you are, what is causing heavy air pollution, and how it makes you feel.*

3. *Tell where you are and how the rains in this country make you feel. What are the rains doing to the area where you are?*

MUSIC

Listening to Woodwind Instruments.

Silver Burdett's, Making Music Your Own, Grade 4, has the woodwind instruments illustrated on page 20.

Review with the class the names of the woodwind instruments. *How is a tone produced on a woodwind instrument?* (Blow across or into the tube of the instrument and the air column inside the tube is set in vibration which produces the tones. As with the brass instruments, different pitches are created by changing the length of the column of air. This is done by covering the holes with the fingers or padded keys).

Listen to a musical recording and try to match the sounds to the proper instrument.

Suggested records:

Chasse a Valabre -- Darium Milhaud
This was composed for a woodwind quintet and is a musical description of a hunting party. Listen for the hunting calls. The bassoon (lowest sounding woodwind), plays sounds that are like the panting of a hunted animal.

Concerto in G Minor -- Antonio Vivaldi
This music does not tell a story. The bassoon plays a steady bass line which is easy to discern.

These records are included in the set of accompanying records for Making Music Your Own, Bk. 4, Silver Burdett.

If you do not have access to these materials you may have records in your school music library that could be used for listening to brass and woodwind instruments.

Ask if anyone has a recording of his own in which wind instruments can be heard. Let volunteers bring a record tomorrow. The class will listen to these records and identify the wind instruments.

ART

Time 2 days
Materials: crayons, water colors, cut paper, materials for a collage, etc.

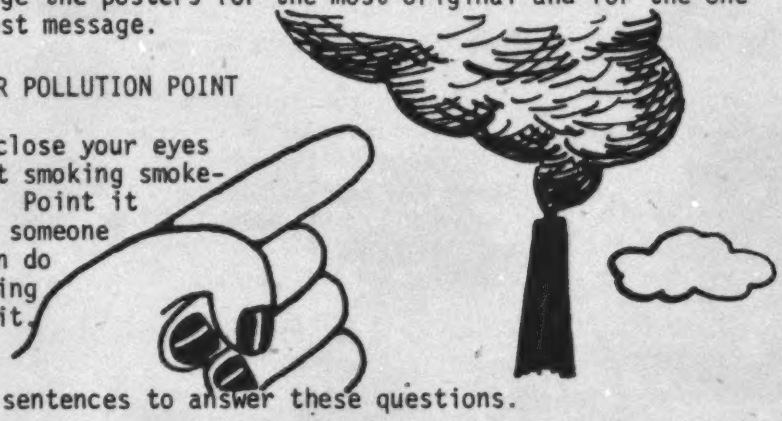
Procedure:

Discuss Air Pollution Posters and possible captions
Examples: Air Pollution Can Kill
People Versus Air Pollution
Whooooo's Got a Solution to Air Pollution
Danger---POLLUTED AIR----Handle With Care
If we Can Put a Man on the Moon we can Stop Air Pollution
Discuss possible art media. (crayon, water colors, material for collage, etc.)

Plan their posters, decide on materials and prepare a rough draft. Collect materials they will need. Use two or more periods to complete the posters. Plan to display them in hall bulletin boards or in the library. Ask the school librarian or some other room to judge the posters for the most original and for the one with the best message.

THE AIR POLLUTION POINT

Don't close your eyes to that smoking smoke-stack. Point it out to someone who can do something about it.



EVALUATIVE ACTIVITY:

Write complete sentences to answer these questions.

Let us suppose that you are visiting a large city on a warm summer day, and you find that the sun's rays are not visible.

1. Why can't you see the sun?
2. How do you feel?
3. What has caused this air pollution?
4. How are these pollutants transported, or moved?
5. What damage will this pollution cause?

SUGGESTED EXTRA ACTIVITIES:

1. Study the classified ads and write a job want ad for some "air" related job.

2. What is the main industry in your town? How might the climate and weather affect this industry and its operation? Think of the effects, good and bad, that this industry has on you, on air, and on animals and plants. List these effects.

	Good effects	Bad effects
On air		
On you		
On animals		
On plants		

3. Poetry in Motion!
   Write a poem entitled "There's Something in the Air".

4. SPOILER
   Defend man.
   Make a list of things that man hasn't affected.

5. Go outside. Capture some clean air. Now prove that it isn't.

LESSON 7

Designed for 2 days

CONCEPT: Correcting air pollution is both possible and necessary. Eco-Kids will join Future Man, the problem solver as he develops creative solutions to the problems of the environment and to the quality of life in the future.

MATERIALS:

Kit Materials
Transparencies:
1. Ringelmann Chart
2. Electrostatic precipitator
Rubber comb
Piece of wool cloth

Non Kit Materials
Overhead projector
Resource Center
Writing materials
Air notebooks
Sheet of paper and chalk dust
Musical recordings brought by volunteers
Art materials
18"x24" colored construction paper

PROCEDURE:

ORAL LANGUAGE

Air pollution is a serious problem. Man can clean up the air as well as pollute it. Man is the one living thing on earth that can understand what ecology is and can do something about it. The plants and animals can only go on doing the same things. Man can learn and make changes. Man is a problem solver. He is a partner in nature and can make changes that will improve our quality of life in the future. What happens in the future depends on what kind of partner he continues to be.

As Eco-Kids let us make plans to join Future Man as he develops creative solutions to the problems of the environment and to the quality of life in the future.

Let us begin by reviewing the types and causes of air pollution. What are the two main groups of air pollutants and what causes these pollutants? Discuss.

Particulates is one group and is made up of smoke, soot and dust. These particulates are caused by factories, electric power plants, home heating furnaces and incinerators. The second group is harmful gases. Sulfur dioxide is caused by burning of coal and oil. Carbon monoxide and hydrocarbons are caused by gasoline engines.

Fighting air pollution isn't new. One of the first tries to find out how much pollution was coming out of smokestacks was made over 74 years ago. A man named Maximilian Ringelmann made five smoke charts. Each chart was printed in a different shade of black. The charts showed how much fly ash and dust were in the smoke. A person could tell how polluted the smoke was by holding the charts up in the air to match their color with the smoke. Which do you think is more polluted -- dark or light smoke? Why? Discuss. (Show transparency of the Ringelmann chart.)

Scientists now have several ways of controlling smoke and other particulates. For example, giant vacuum cleaners are often used to collect dust from factories. The electrostatic precipitator is also used to collect dust.

Show the transparency depicting the electrostatic precipitator as you explain how it works.

The large box next to the smokestack is the machine. It works like a magnet. The fly ash and dust pass through an electric screen. This makes the ashes and dust magnetic. The magnetic ashes and dust pass through another electric screen. But this time they stick to the screen like a magnet. When a lot of fly ash gets stuck to the screen, the electricity is shut off. The trapped fly ash drops into a collection box. In our science class this afternoon we will make an electric air cleaner.

Some scientists try to reduce air pollution by educating people to use less fuel. Others work to change the fuels and the engines that are used. They also work on trapping the gases and particulates from engine exhaust before they go out into the air.

Air pollution can be cleaned up, but it costs money. Would you and your family be willing to help pay for cleaner air? Can you think of any other ways that you could help? Discuss.

LANGUAGE ARTS

READING

Continue reading and preparing reports on air pollution, its causes and how Eco-Kids can help solve this problem.

SPELLING

Select words from the Air related words that you wish to use for a written test. Those with high or perfect scores may decide upon some type of reward -- running a race out on the playground, game of ball, free time, etc.

This suggested type of test checks both their spelling and understanding of the words:

Examples:

1. This is another word for the air around the earth. atmosphere
2. The pressing weight of air against things on earth. pressure
3. A gas found in the atmosphere that plants and animals must breathe in order to live. oxygen
4. A mixture of gases which surrounds the earth. air

5. Condition of the atmosphere, including wind, clouds and temperature. weather

6. Anything that has weight and takes up space. matter

7. Water is this kind of matter. liquid

8. Air is this kind of matter. gas

9. Your desk is this kind of matter. solid

10. Layer of atmosphere nearest the earth. troposphere

11. Moving air. wind

12. The layer of atmosphere above the troposphere. It has almost no air, clouds or wind. stratosphere

13. Contamination which makes our air unclean or less pure. pollution

14. These are champions of all that is good and clean and are friends of plants and animals. Eco-Kids

15. One of the gases in the air which plants use. carbon dioxide

ENGLISH

Edit and assemble all materials for their notebooks. They may wish to rewrite some of their pages.

MATH

Pose some challenging story problems for the class to solve together.

Examples:

1. Some jet planes travel at twice the speed of sound. Some of these planes fly at altitudes of 5 miles. Sound at this altitude travels at about 600 miles per hour. How fast would these planes to traveling at this altitude?
   (600 x 2 = 1200 miles per hour)

2. Planting pine seedlings was a Scout project. The boys had 2,259 pine seedlings. They planted 9 seedlings in each row. How many rows of pine seedlings did they plant?
   (2,259 ÷ 9 = 251 rows)

How did these Scouts join Future Man in improving the quality of life in the future? (These trees will grow larger each year and will put more oxygen into the air.)

3. The speed limit on some highways is 60 miles per hour. Suppose a car made a trip from one city to another in 5 hours. The car traveled at a constant speed of 60 miles per hour. How many miles apart were the two cities?
(60 x 5 = 300 miles)

This car caused air pollution. What means of transportation could have been used that would have caused less air pollution?

If time permits ask for volunteers to pose problems for the class to solve.

SCIENCE

Is it true that there is always the same amount of air in the atmosphere? (yes)

What happens when air in our area flows to another area of the Earth? (Air flows in from somewhere else.)

Why, then, is it so important that air pollution be controlled? (Because all living things need clean air and the atmosphere will never get more air than it now has.)

Who has caused pollutions and who can improve conditions on Spaceship Earth? (Man is the enemy and only man can change his ways and improve our world.)

Do you know of anything that has been done to control air pollution? Discuss.

The Federal Government has passed laws against air pollution. Scientists are working to get rid of wastes without causing air pollution. Inventors are trying to design means of transportation that will not send fumes into the air. People are searching for new ways of doing things so that all living things may breathe clean healthy air that they need.

What causes the most air pollution? (Automobiles and trucks)

There would be less air pollution if automobiles, airplanes, trucks and trains were used less. Do you think people can learn to need or want less transportation? Discuss.

Are there times when you and your family could use your car less than you presently do? Possible answers: Share rides with neighbors, walk when possible, use bicycles, turn car motor off when car is not moving, etc.

Earlier today we learned about a machine called the electrostatic precipitator. To see how this works we can make an electric air cleaner.

Materials: Hard rubber pocket comb
Piece of wool cloth
Piece of paper and chalk dust

Procedure:

Volunteers demonstrate:

Put a small bit of dust on a piece of paper. Rub the comb a few times with the wool cloth. Touch the comb to the dust. What do you predict will happen?

What happens?

After a few minutes, what happens to the dust on the comb?

Why? How is this like the machine, the electrostatic precipitator?

How is electricity produced? (By power plants that burn fuel that puts particulates into the air.)

In yesterday's lesson you listed electrical appliances that are used in your home. Today make a list of those that you think you could give up--thus helping to prevent less air pollution. Compare lists.

Make a list of ways Eco-Kids help in the air pollution problem.

Possible answers:

1. When asked to rake leaves in the fall, suggest that a compost pile be started instead of burning the leaves.
2. Remind families and neighbors not to burn trash. Old Christmas trees can be used in several ways--even as bird feeders.
3. Share rides with neighbors.
4. Walk whenever possible.
5. Use bicycles when possible instead of asking for rides in the car.
6. If the incinerator of an apartment house, office building or factory is making the clothes on the line dirty, complain or suggest to your parents that they do so.
7. If you see dirty smoke rising from a stack, tell your parents or teachers.
8. Turn off lights when they are not needed.
9. Don't ask for electrically powered toys.
10. Use electric appliances only when necessary.
11. Write letters to parents telling how they, too, can help stop air pollution.

What types of workers are needed to help Future Man keep our air clean? List all the careers you think would help do this work. Discuss.

Possible answers:

1. Engineers to build dams and sewage systems, so that garbage will not be burned. Water, as well as air, must be kept clean or the plants in the water that produce oxygen will die.

2. Chemists to test air and water to see if they are safe.

3. Researchers to discover new ways to make air clean.

4. City engineers and planners, to plan cities and towns so factories and dumps that might pol'ute the air and water are not built near homes.

5. Inventors to design cars, buses, planes and trains that will not send fumes into the air.

6. Scientists to find ways to get rid of industrial wastes without polluting the air.

Perhaps one day you will enter one of these useful fields of work and will create solutions to the problems of the environment and to the quality of life in the future.

Think about this and tomorrow you will choose one of these occupations for your life work. What will you do for your city 15 years from now. By that time you will have completed your education and will be working as Future Man, developing creative solutions to the problems of the environment and to the quality of life in the future.

SOCIAL STUDIES

Choice of:

1. Field trip to radio or television station or to a local newspaper.
2. If a guest speaker made a presentation yesterday, discuss and summarize the lesson. Write thank you letters.
3. If no presentation was made yesterday, this is a suggested lesson:

PROBLEM SOLVING:

Divide the class into small groups. Give each group a problem to discuss and solve, making a presentation to the class when completed. Or you may want them to work individually, writing their solutions.

1. You are the owner of a factory that is causing much pollution. Should you close down your factory and lose money and put others out of a job as well? What is the best solution?

2. You are a manager of a large airport. People in the area complain that your airplanes are polluting their air. What are you going to do about it?

3. Your car is causing pollution in your community. This is your only means of transportation. What should you do about it?

4. Gasoline buses are used for public transportation in your city. They are becoming quite old and causing more pollution each month. What could be done to solve this problem?

MUSIC

Listen to recordings brought to school by students. Try to identify the various wind instruments. Be prepared to play a record from your school music library in the event no class members bring records.

Reports from any class members who may have done research reading on how to make a wind instrument. Share their products if they have made an instrument.

ART

Complete Air Pollution posters.

Begin to design permanent covers for their Air Notebooks. *As you plan a cover for your notebook what are some things you may want to include on the cover?* (A title, name of author--written and illustrated by _____, some type of illustration.)

What are some interesting art media that you could use? (Cut paper, painting, drawings, colored chalk, objects from nature, etc.)

You have put much work into these notebooks and now you will want to design an interesting and different type of cover. Be creative! You may start it today and use an art period tomorrow to complete it. Think about how you will want to fasten your notebooks together. What could you use? (paper punch, yarn, brads, staples, etc.)

Pass out paper for notebook covers, letting each student select a color.

SECOND DAY

LANGUAGE ARTS

1. Share reports from research reading -- problems of air pollution and ways to solve these problems.

2. Correct errors made in yesterday's spelling test.

3. Complete covers for Air notebooks.

4. Assemble and complete Air notebooks.

SCIENCE

Yesterday we talked about the fields of work for Future Man as he develops solutions to the problems of the environment and to the quality of life in the future. What are these careers? (Brief review)

Your formal education and training are completed and you are Future Man working to improve the environment and quality of life on Spaceship Earth. Choose one of the fields of work. Tell what you will do for the environment. Be creative - invent something we do not have today. Any amount of money is available to you. Really improve the quality of life on Spaceship Earth. Share and discuss their writings.

EVALUATIVE ACTIVITY:

1. Their reports from research reading on air pollution--its causes and how Eco-Kids can help solve the problem, will serve as an evaluative activity.

2. Completed notebooks, too, will be used as evaluation.

SUGGESTED EXTRA ACTIVITIES:

1. Find information on the electric automobile. Why is it being developed? What are the problems?

2. Design a lapel button with a slogan that will inform people about the need to reduce air pollution.

3. Plan a transportation system for your city for the year 2000. What effect will it have on energy use and air pollution?

4. Go outside and find joy in your environment. Are energy and air pollution involved in any of these? List them.

For your convenience the films used in this ELE are listed on this tear out sheet. Simply add the dates required and mail to the Instructional Material Center, ERAC.

Project ECOLogy

- - - -